

## التحليل النطقي والفيزيائي للأصوات المفخمة في العربية

إعداد

نادر جمعة عثمان حنفية



قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الدكتوراه في  
اللغة العربية وآدابها

كلية الدراسات العليا  
الجامعة الأردنية

أيار، ٢٠٠٨



الجامعة الأردنية

نموذج التفويض

أنا نادر جمعة عثمان حنفية، أفوض الجامعة الأردنية بتزويد نسخ من رسالتي /أطروحتي  
للمكتبات أو المؤسسات أو الهيئات أو الأشخاص عند طلبها.



التوقيع:

٢٠٠٨/٥/٢٨

التاريخ:

نوقشت هذه الرسالة (التحليل النطقي والفيزيائي للأصوات المفخمة في العربية)، وأجيزت بتاريخ  
٢٠٠٨/٥/١٥.

### التوقيع



### أعضاء لجنة المناقشة

الدكتور جعفر نايف عبابنة، مشرفاً  
أستاذ مشارك - علم الأصوات اللغوية



الدكتور إسماعيل أحمد عمايرة، عضواً  
أستاذ - علم النحو واللسان العربيين




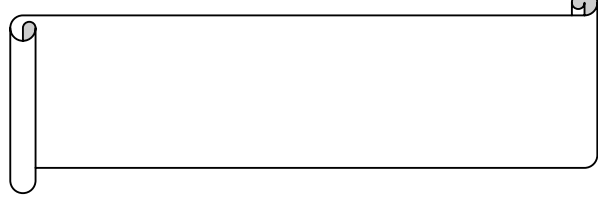
الدكتور محمود جفال الحدي، عضواً  
أستاذ مشارك - فقه اللغة العربية



الدكتور وليد أحمد العناتي، عضواً  
أستاذ مشارك - اللسانيات (جامعة البترا)

تتعمد كلية الدراسات العليا  
هذه التسمية من الرسالة  
التوقيع. التاريخ ٢٠٠٨/٥/١٥





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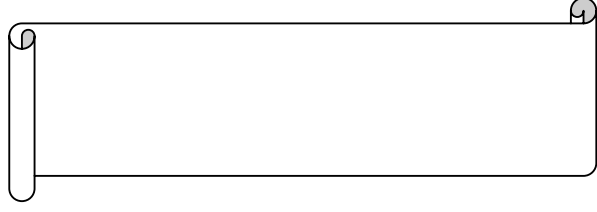
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<https://phonetics-acoustics.blogspot.com>

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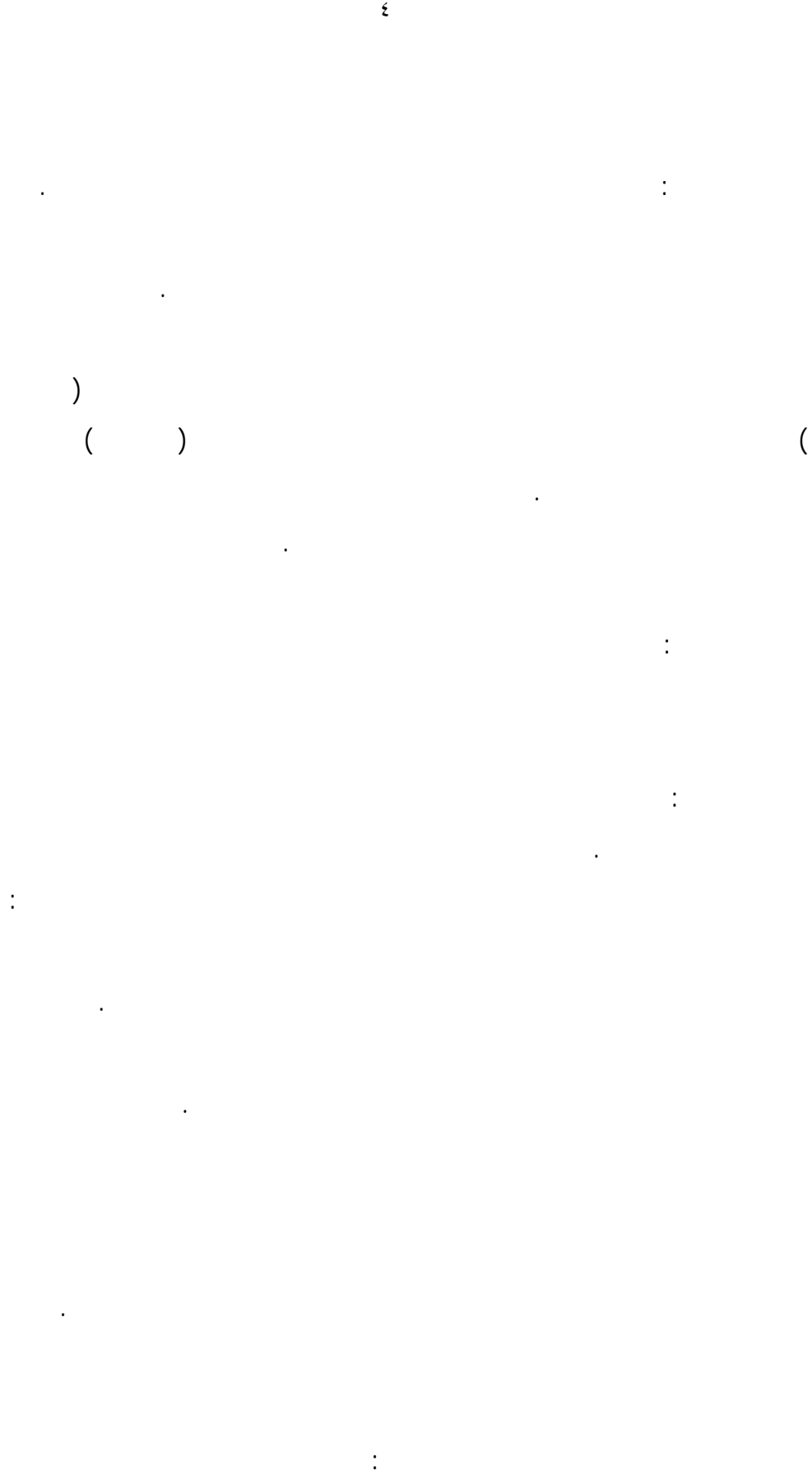
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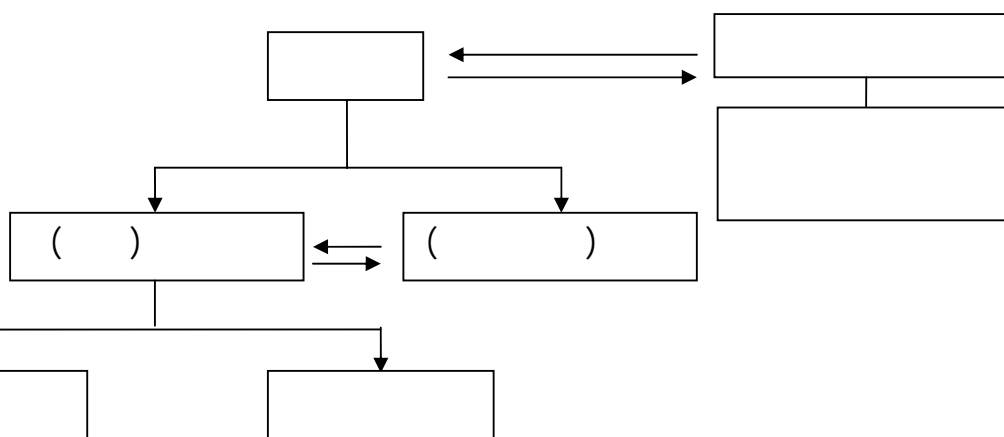
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Walter Lehn, Emphasis In Cairo Arabic, p.306.

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Mohamed Salah El Din, Articulatory Characteristics Of The Arabic Emphatic : ( )  
Plosives, p.151, P 156-157

Yousef Al-Halees, A Xeroradiographic Study Of Emphasis In Arabic, P. 8-10 : ( )



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Al-Halees, A Xeroradiographic Study Of Emphasis In Arabic, P. 1 . : ( )

Al-Halees, Ultrasonic Study Of Emphatic And Non-Emphatic Sounds In : ( )  
Arabic, P.1.

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Al-Halees, Ultrasonic Study Of Emphatic And Non-Emphatic Sounds In : ( )  
Arabic, P.7.

Al-Halees, Ultrasonic Study Of Emphatic And Non-Emphatic Sounds In : ( )  
Arabic, P8-9.

Latif Ali & Daniloff ,Acinefluorographic-phonologic Investigation Of Emphatic: ( )  
Sound Assimilation In Arabic , p 645.

Al-Halees, A Xeroradiographic Study Of Emphasis In Arabic, P. 9. : ( )

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(Suprasegmental Phoneme )		(Prosodic Feature )	
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(Charles A . Ferguson )			
(The Emphatic ﻻ In Arabic )		( )	
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Charles A. Ferguson, The Emphatic ﻻ In Arabic,P. 163-164.		:	( )
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Charles A. Ferguson, The Emphatic ﻻ In Arabic, P.164.		:	( )
Harrell, The phonology ,P.79-82.		:	( )

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Yousef Al-Halees, Ultrasonic Study Of Emphatic And Non-Emphatic Sounds In Arabic, P. 8

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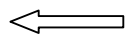
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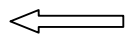
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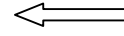
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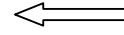
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Charles A. Ferguson, The Emphatic ʾ In Arabic, P.158.

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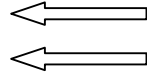
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<https://phonetics-acoustics.blogspot.com>



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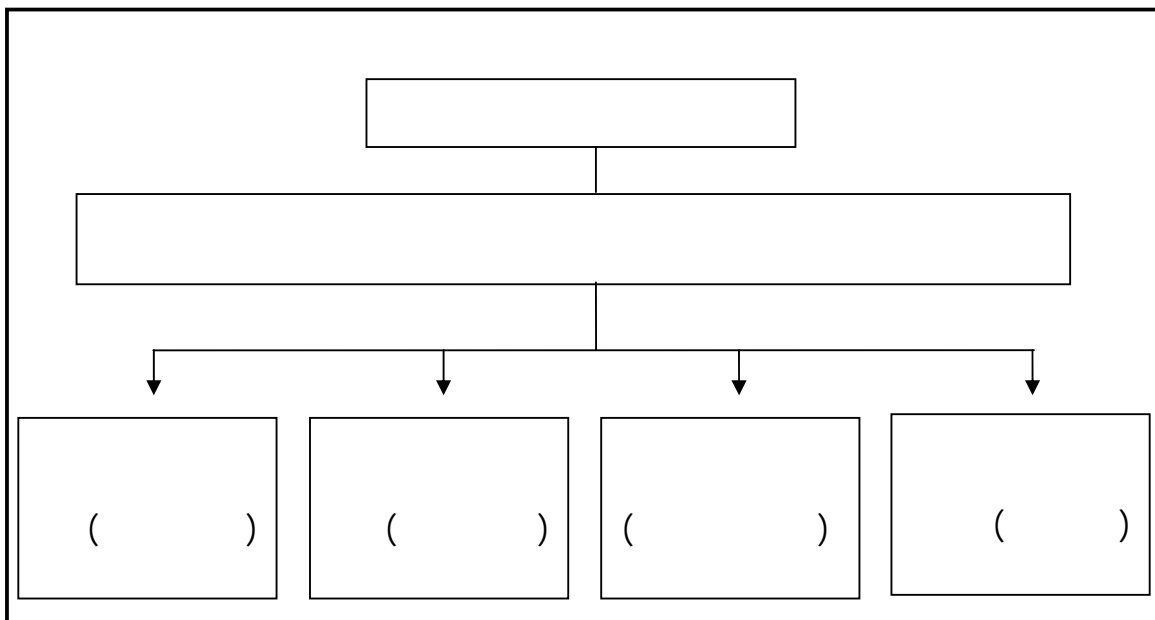
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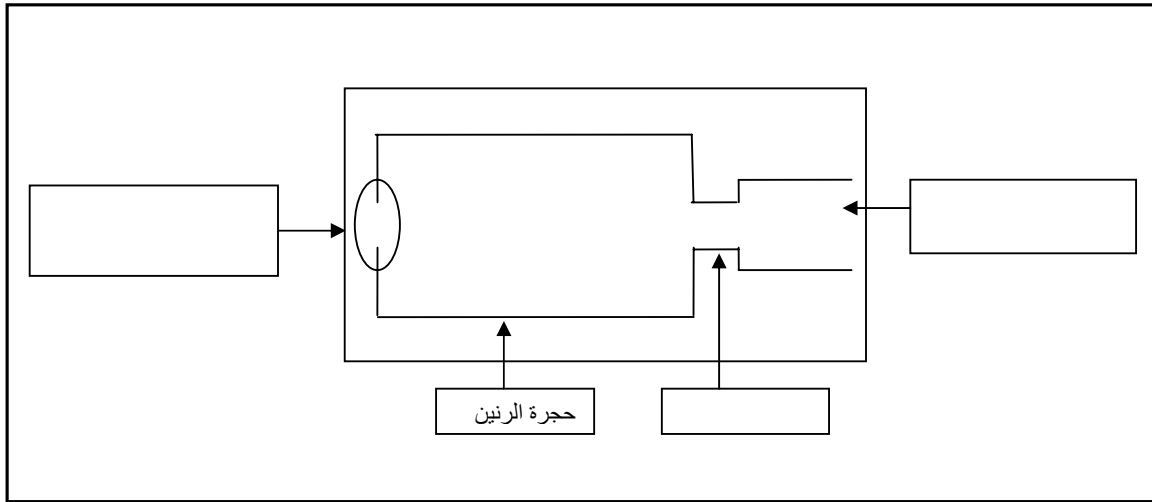
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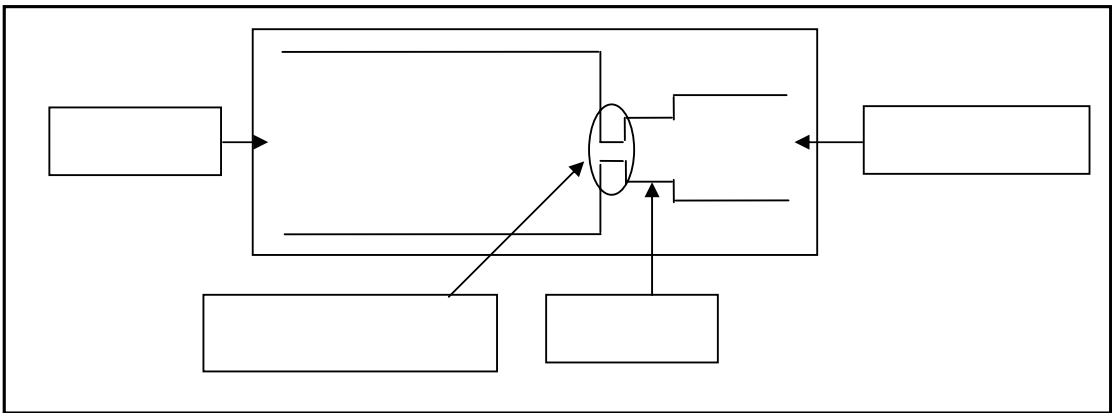


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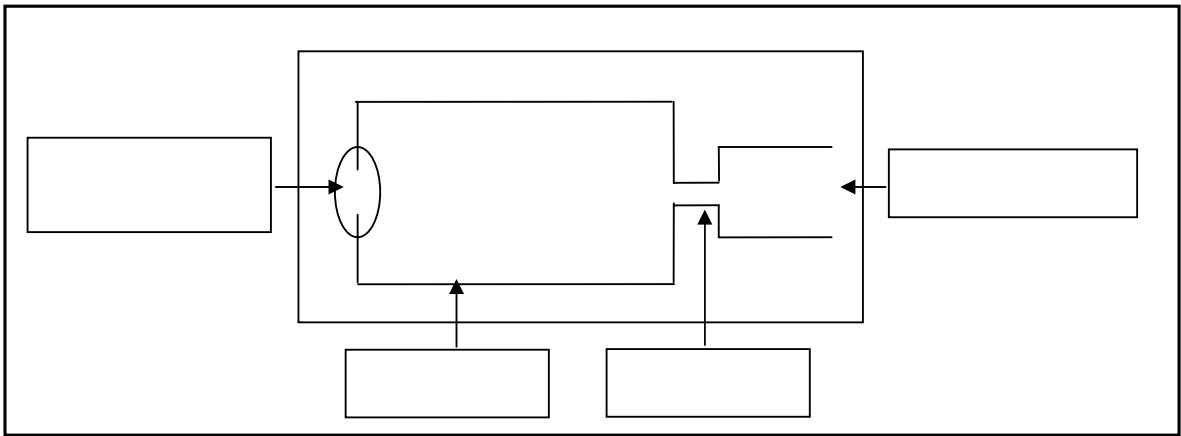
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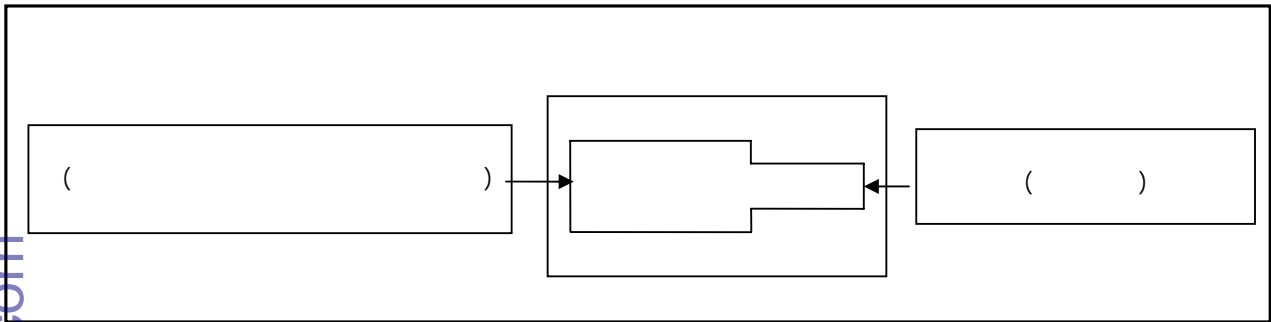
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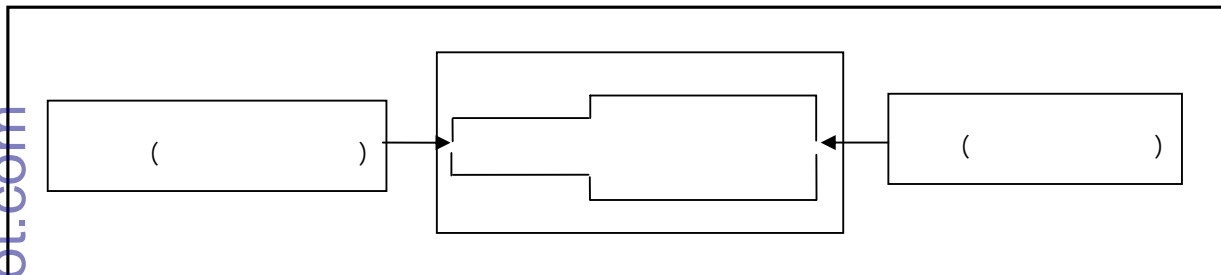
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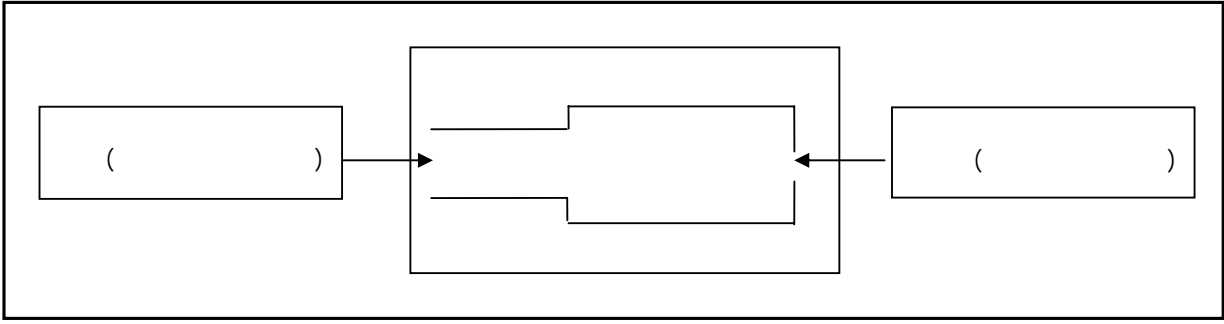
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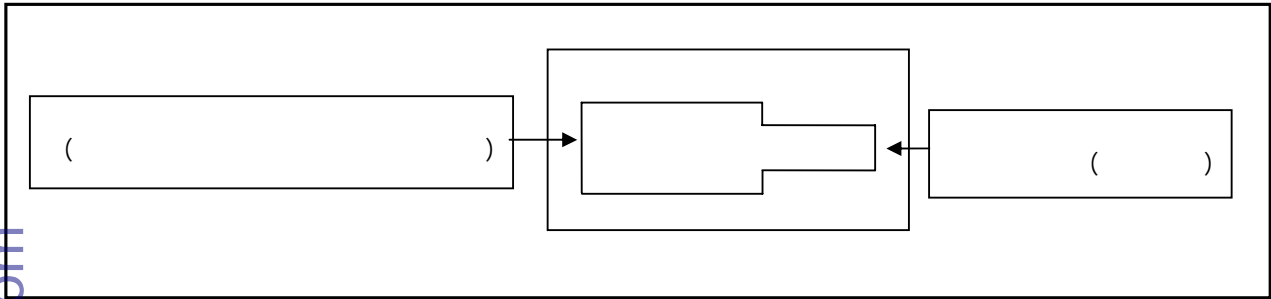




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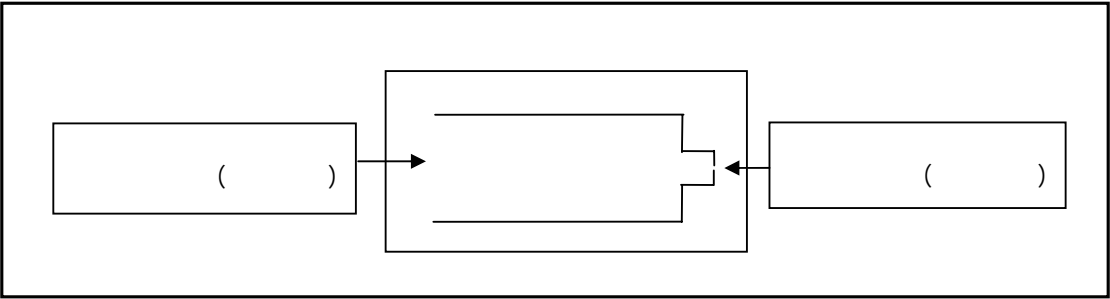
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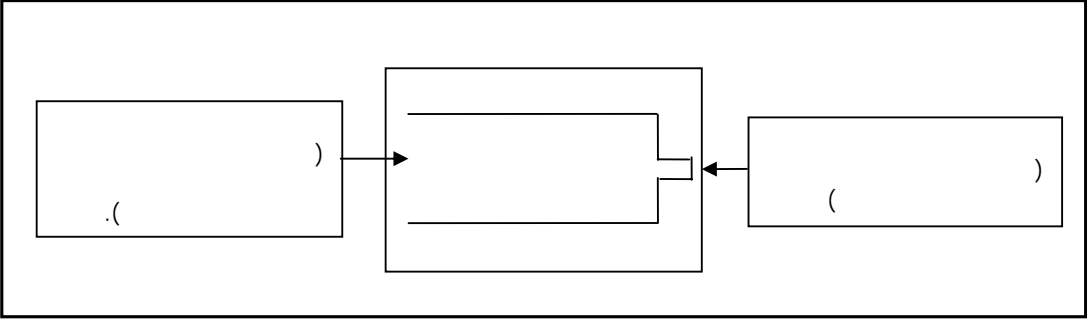


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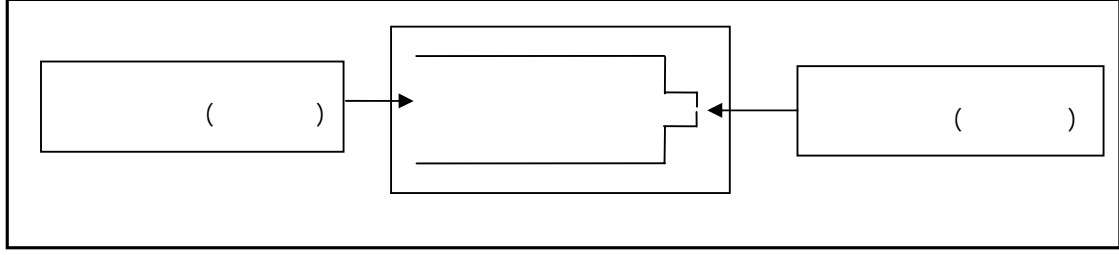
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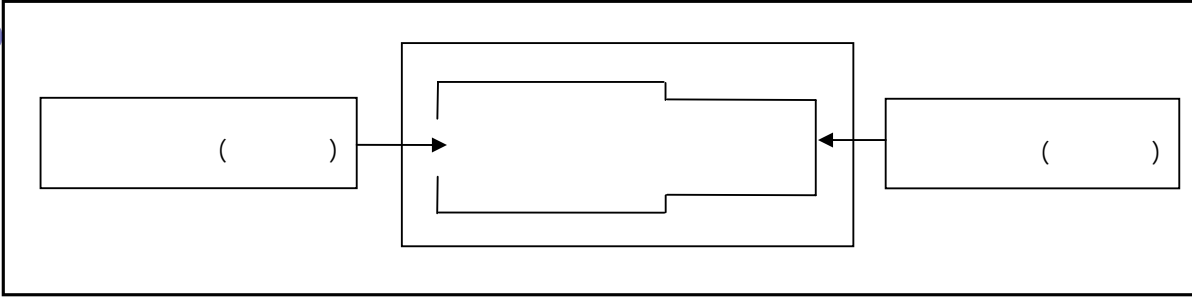


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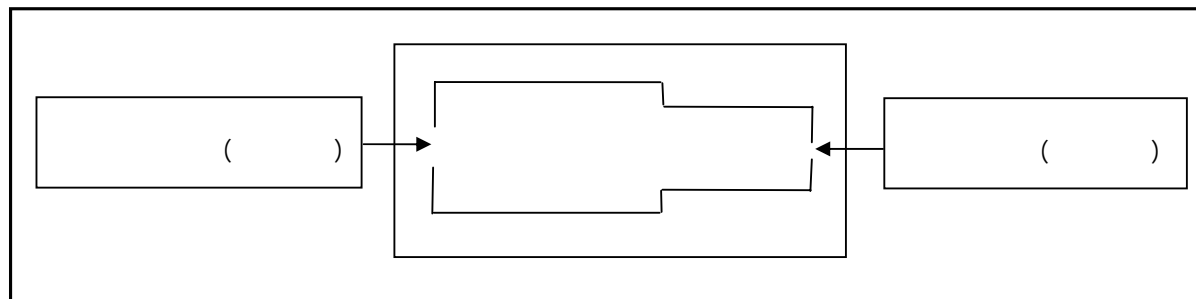


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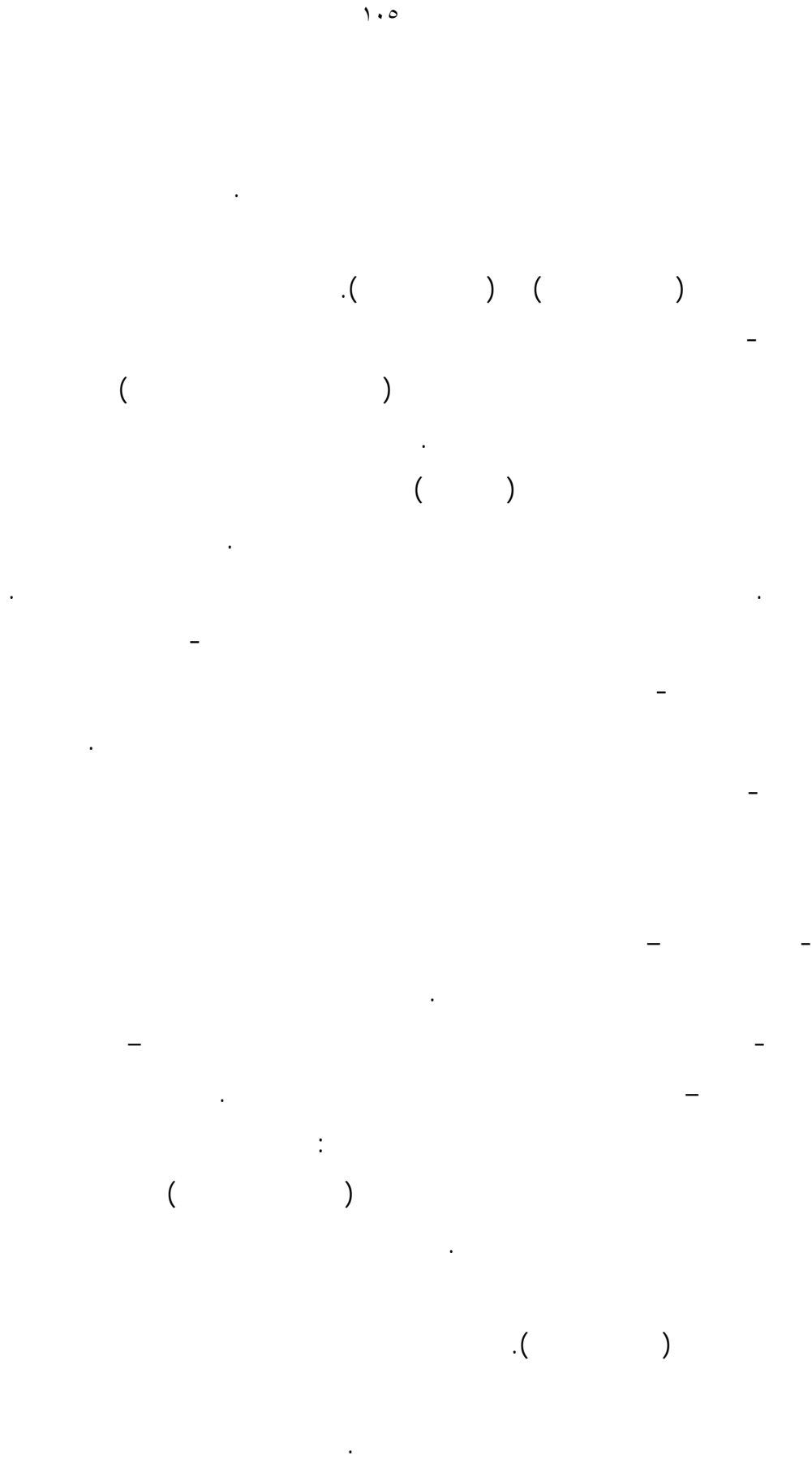
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( Ferguson )

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<https://phonetics-acoustics.blogspot.com>

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<https://phonetics-acoustics.blogspot.com>

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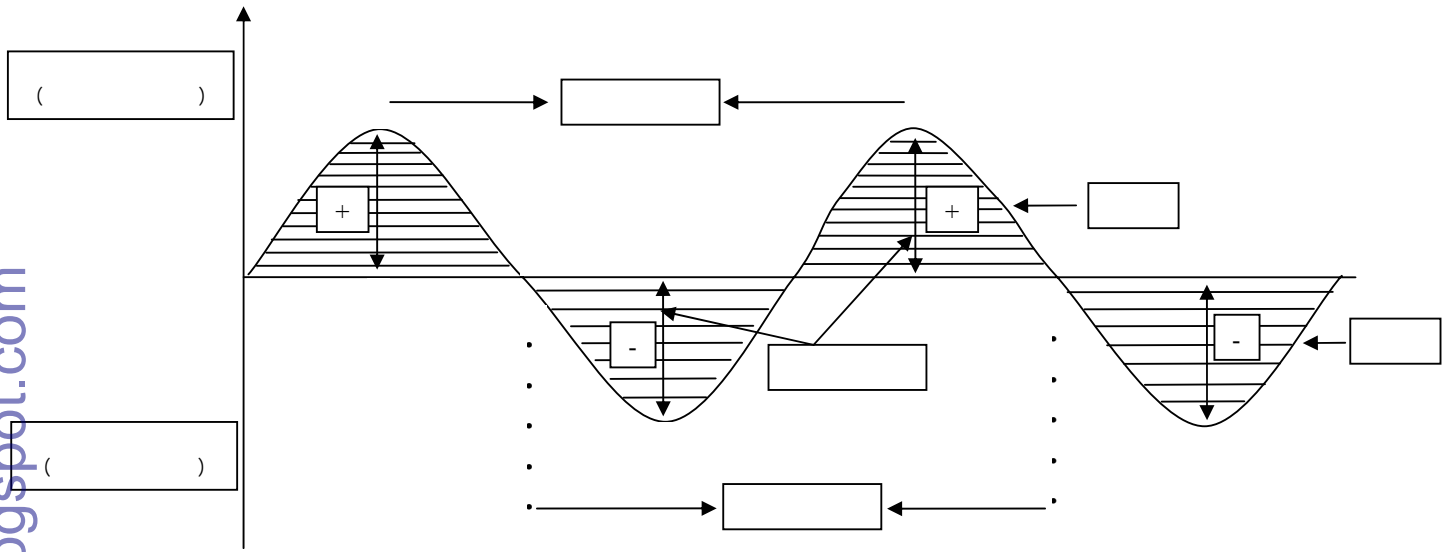
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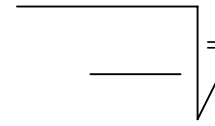
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Fry, The physics of speech, .

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Pickett

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(F1)

(First Formant)

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Philip Leiberan, Speech Physiology and Acoustic Phonetics, P.29-	:	( )
	:	30.
Pickett, The acoustic of speech Communication, P.45.	:	( )
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Yousef EL-Halees, The role of F1 in the place-of-articulation distinction in Arabic, P.287.	:	

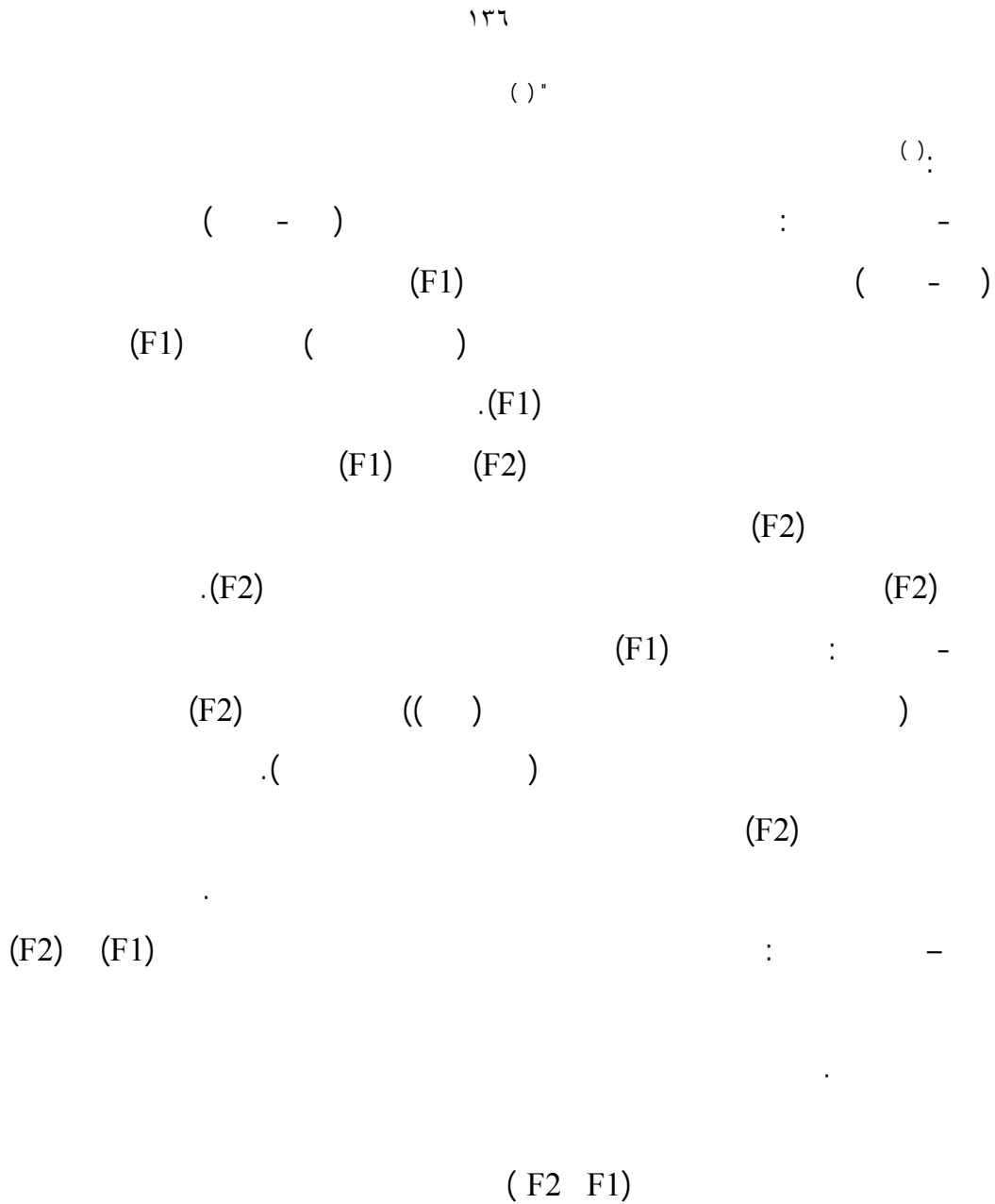
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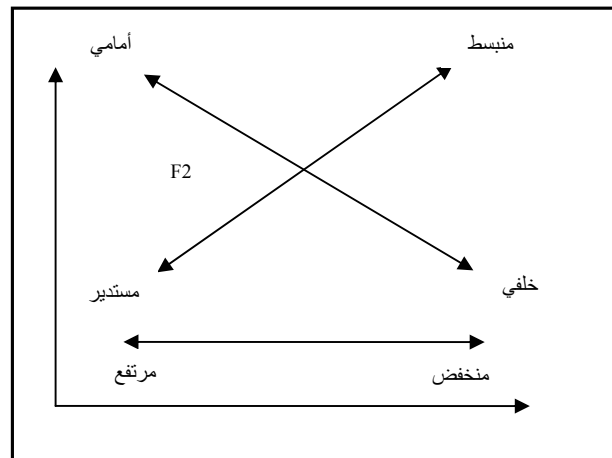


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:Spectrogram

:Wave Shape

:Spectrum

:Energy Spectrum

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(F2)

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Yousef El-Halees, The role of F1 in the place-of-articulation distinction in : ( )  
Arabic, P.297, P.288.

Munther Younes, Emphasis spread in two Arabic dialects, P.131. :

F2 (Hz)			F2 (Hz)	
3952			3151	
2273			2078	
3311			2773	
3086			2018	

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(F2) (F1)

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(F2) (F1) (Hz)			(F2) (F1) (Hz)	
2050			1523	
1512			1673	
1572			2086	
1505			1272	

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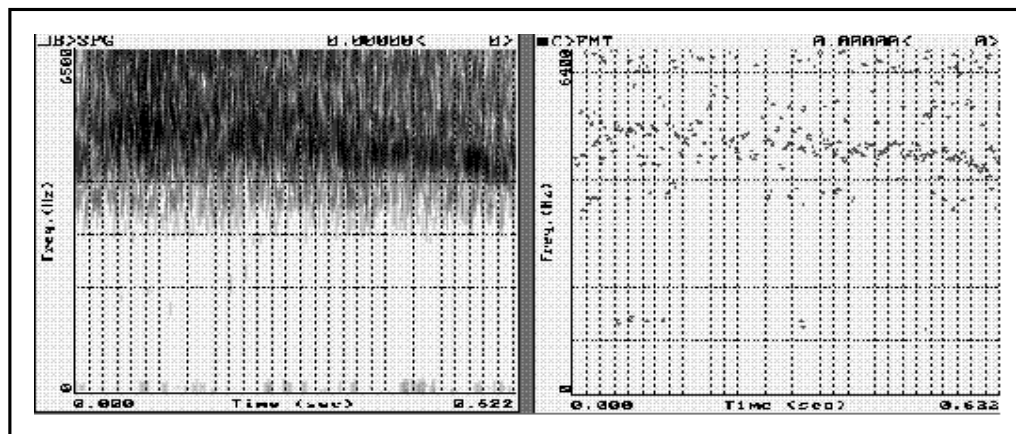
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(F3) (F2) (F1)

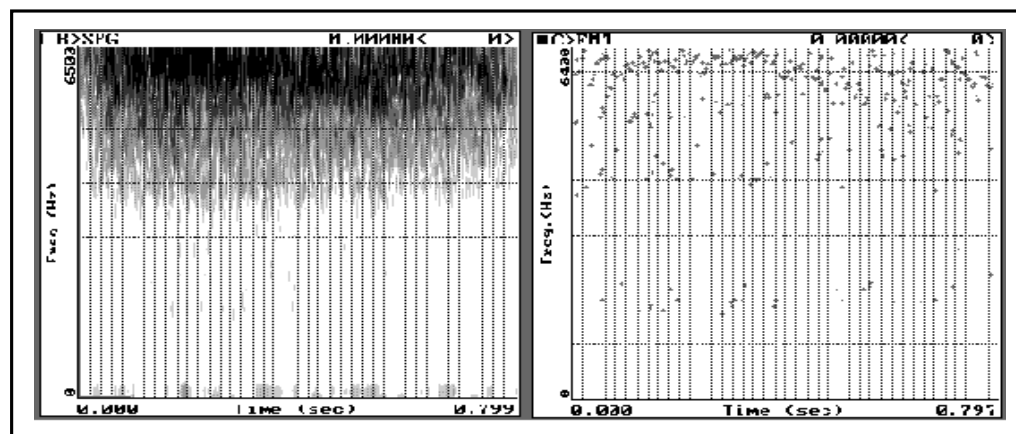
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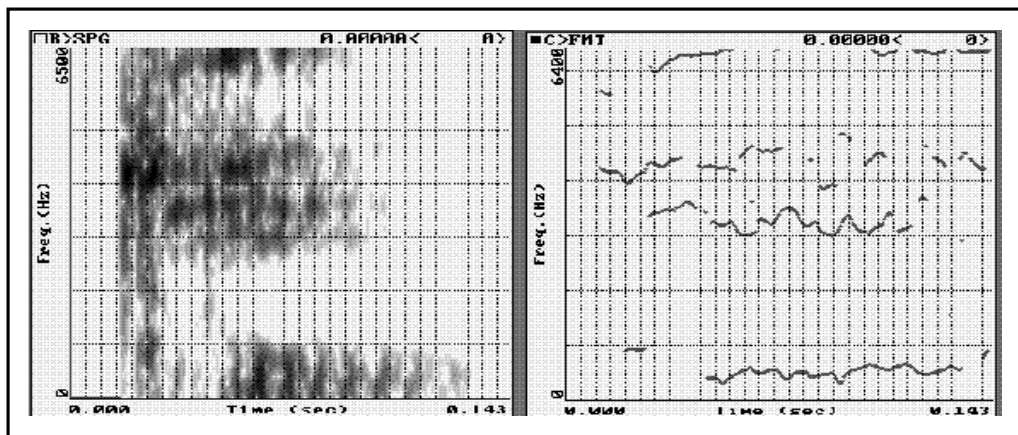
(F1,F2,F3) (Hz)			(F1,F2,F3) (Hz)	
3333			2549	
3697			2403	
3022			2142	
2971			1798	



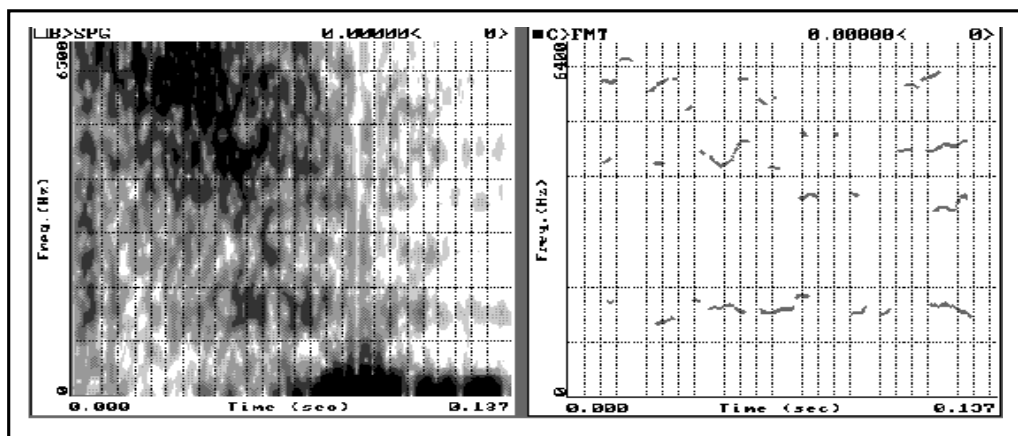
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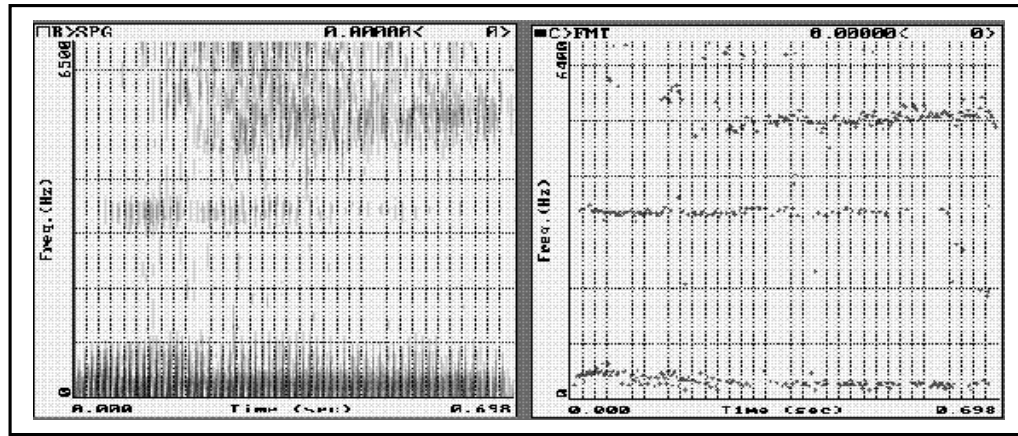
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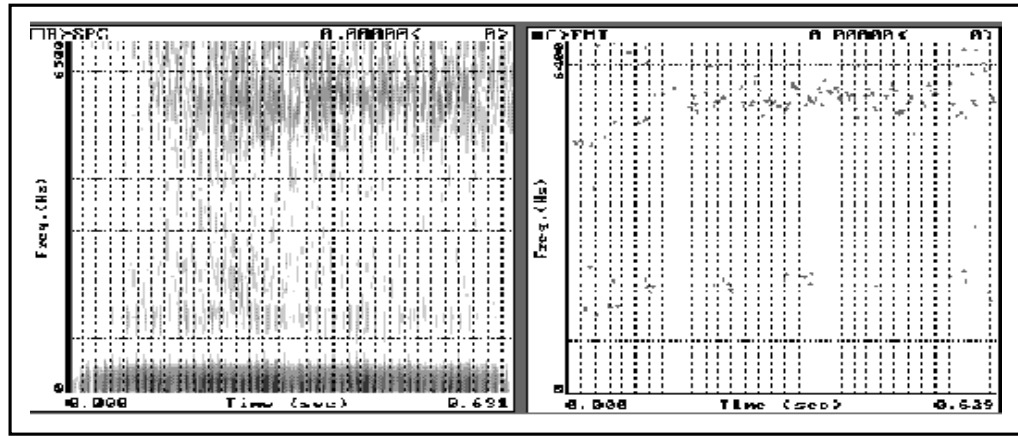
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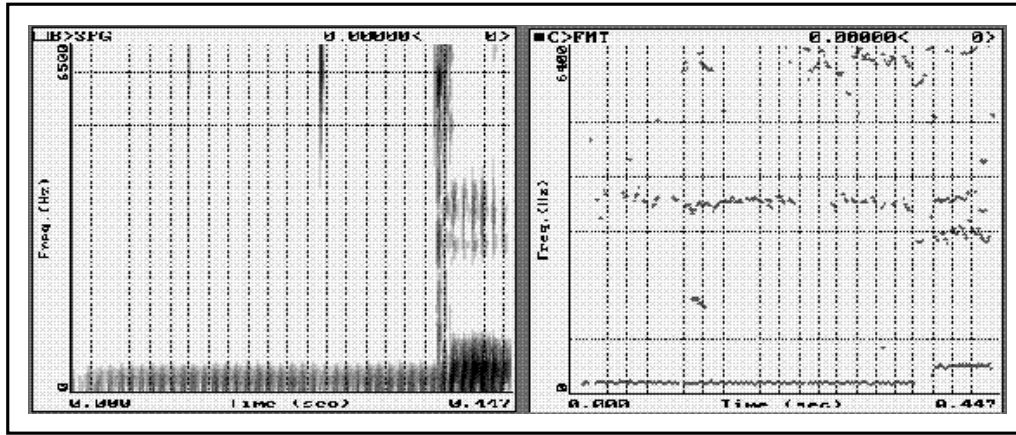
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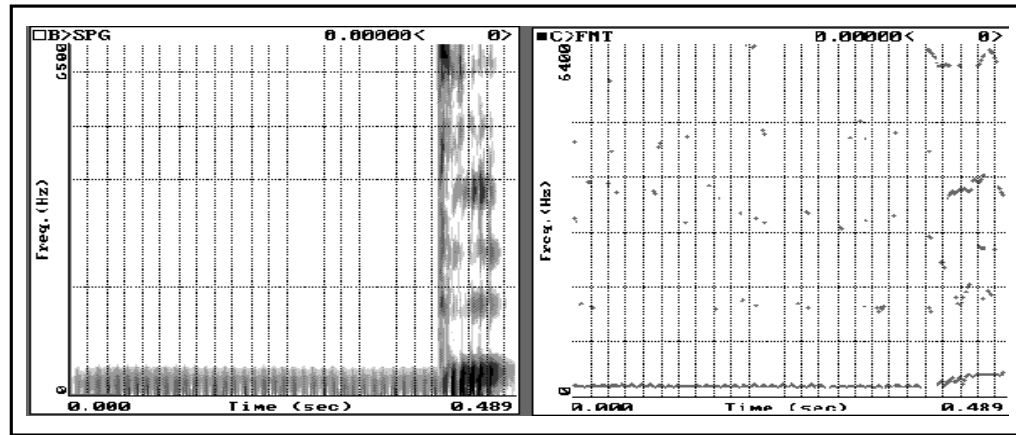
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2357	2111	2772	2697	2625	2176	2291	2103	
2424	2121	3036	2951	2593	2201	2339	2253	
1978	2211	2633	2699	2155	2223	2313	2316	
2098	2480	2759	2755	2337	2305	2375	2414	
2218	2227	2857	2694	2449	2132	2297	2204	
1636	2265	2775	2806	2339	2214	2368	2437	
2109	2399	2678	2716	2380	2377	2456	2481	
2698	2442	3125	2865	2673	2850	2997	2542	

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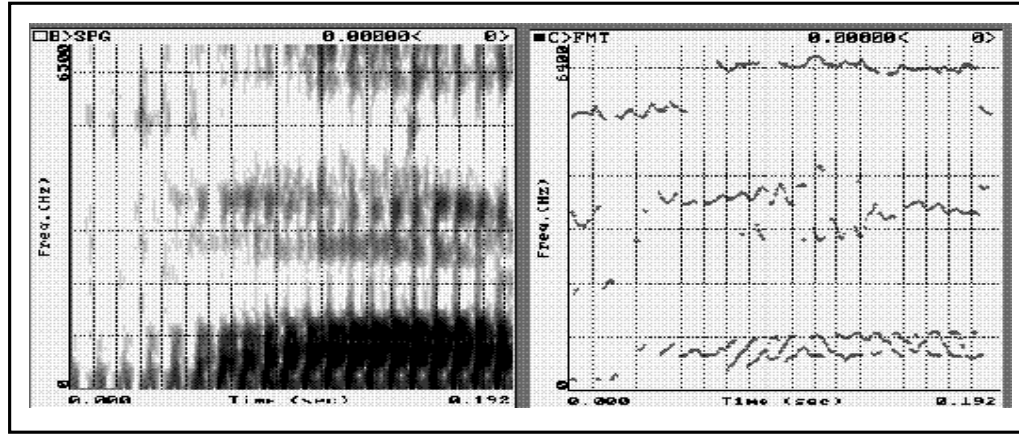
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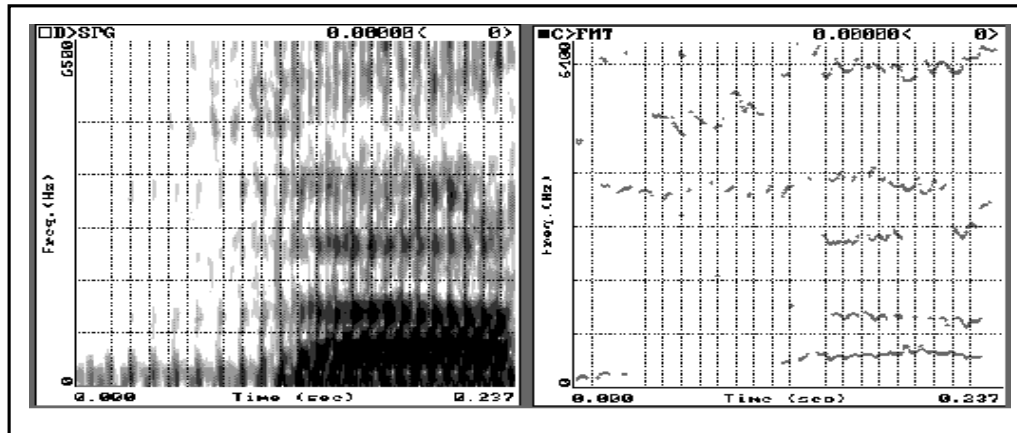
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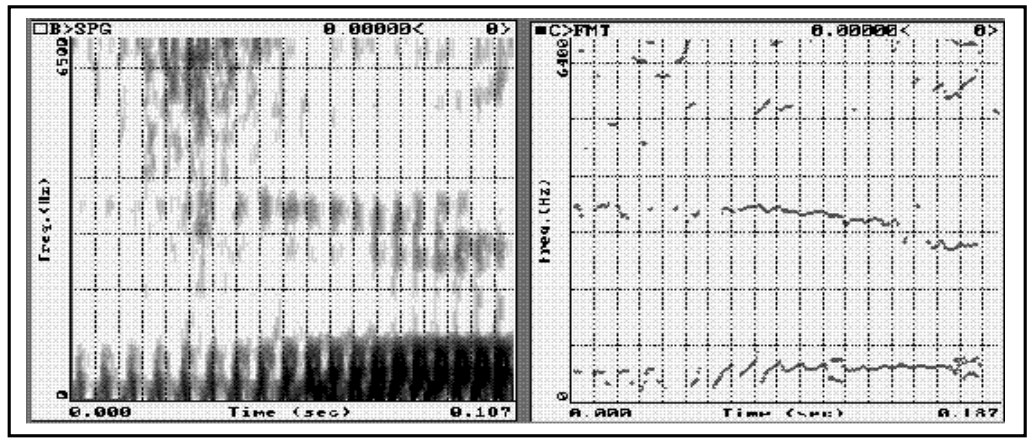


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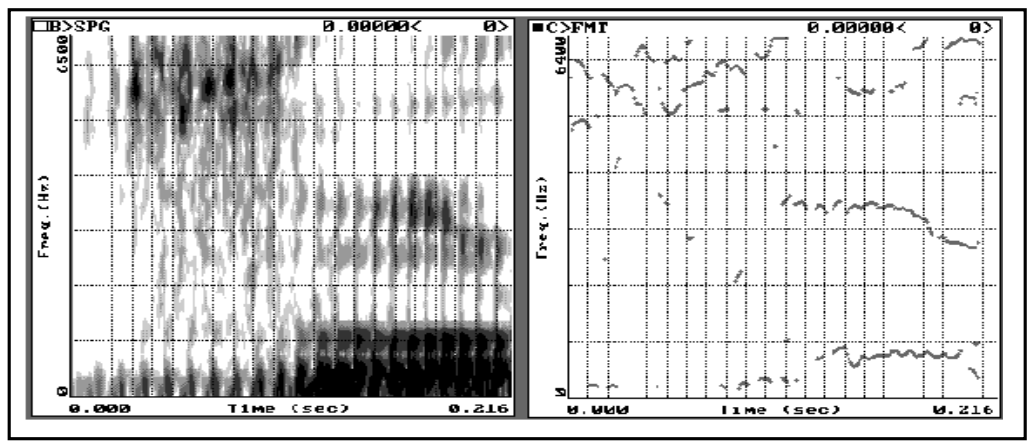


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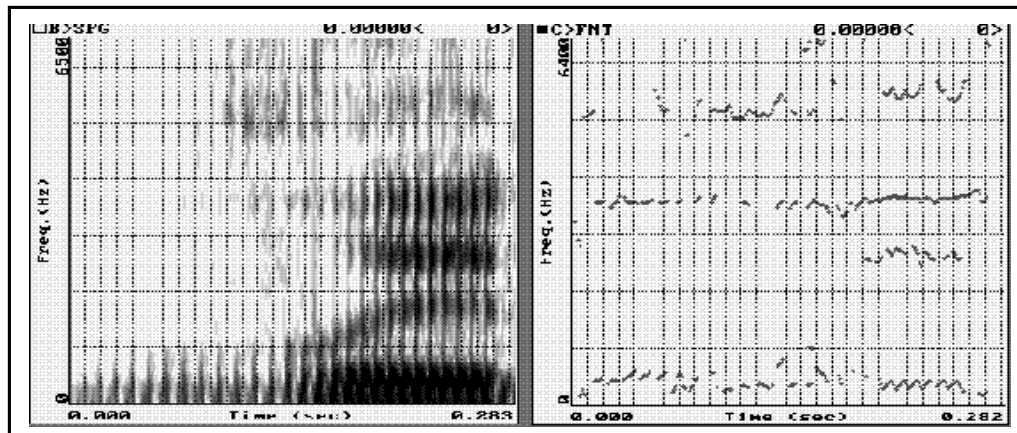




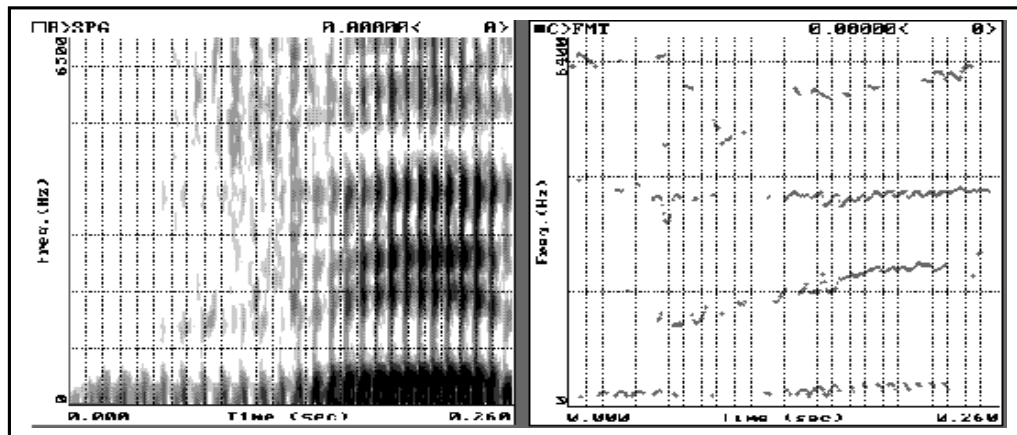
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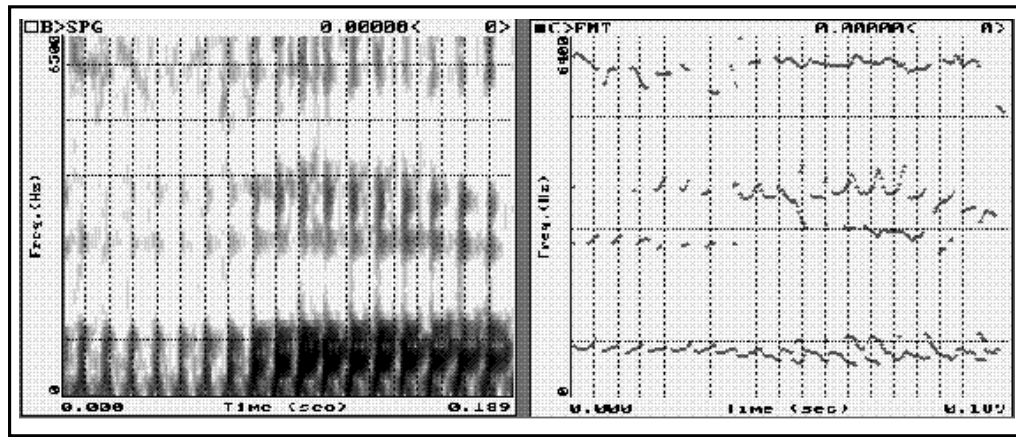
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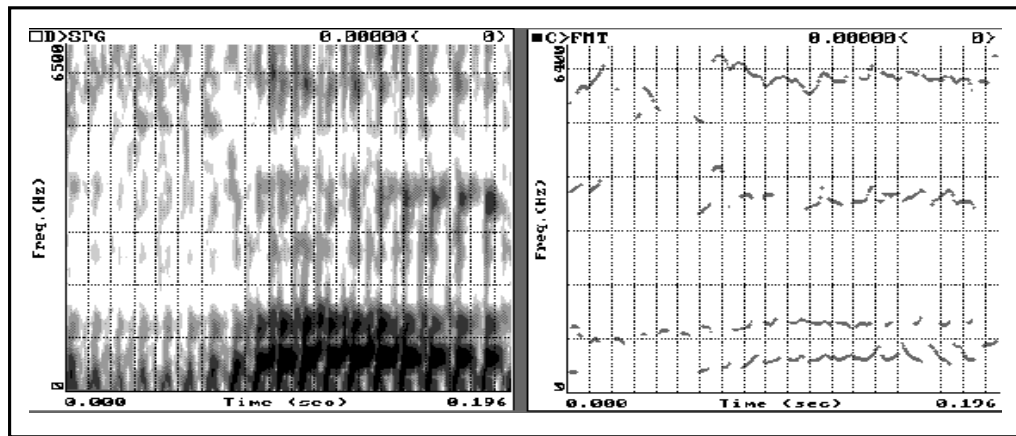
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# الصوتيات - الأكوستिका

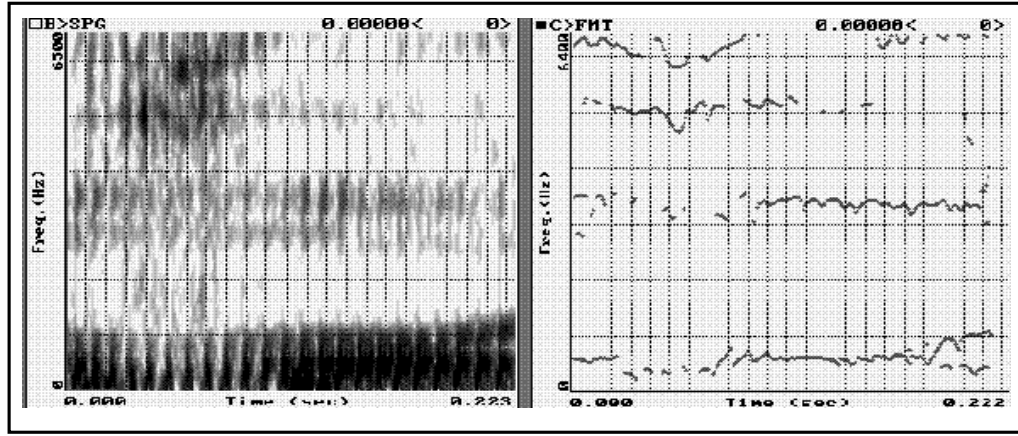
مكتبة و ملتقى علم الأصوات

اللغة - السمع - الإدراك - النطق

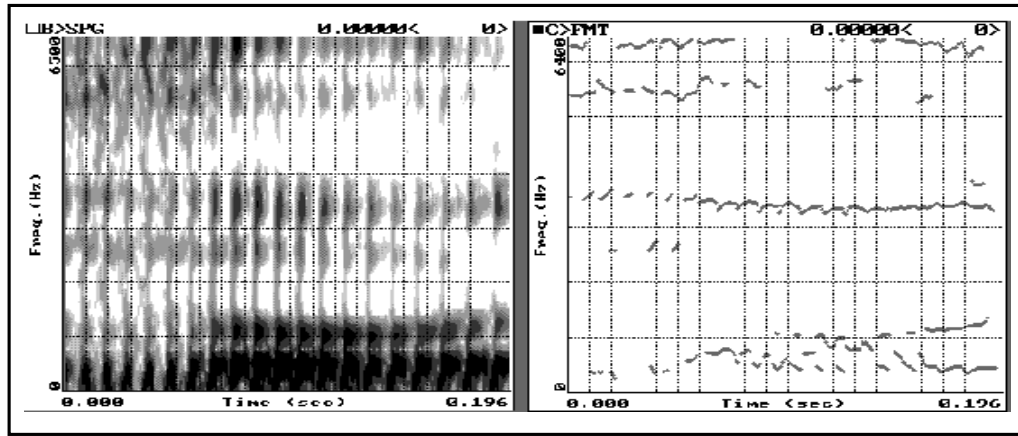
www.facebook.com/groups/Phonetics.Acoustics





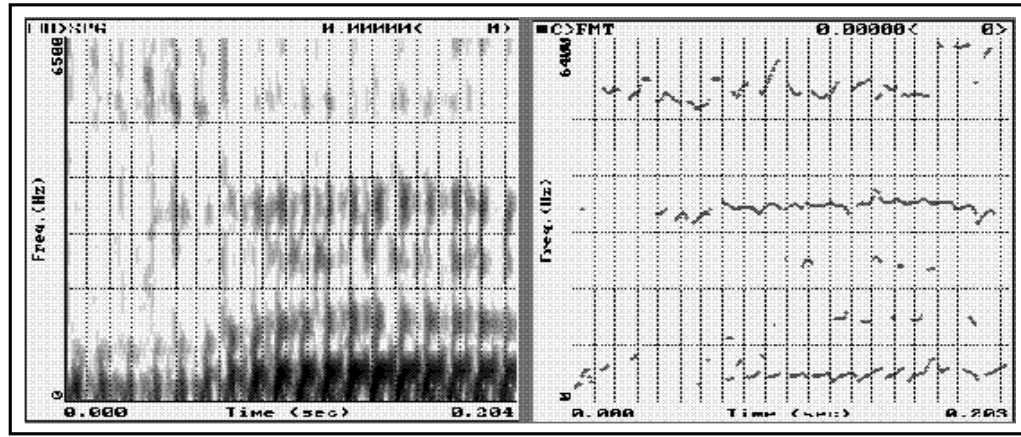
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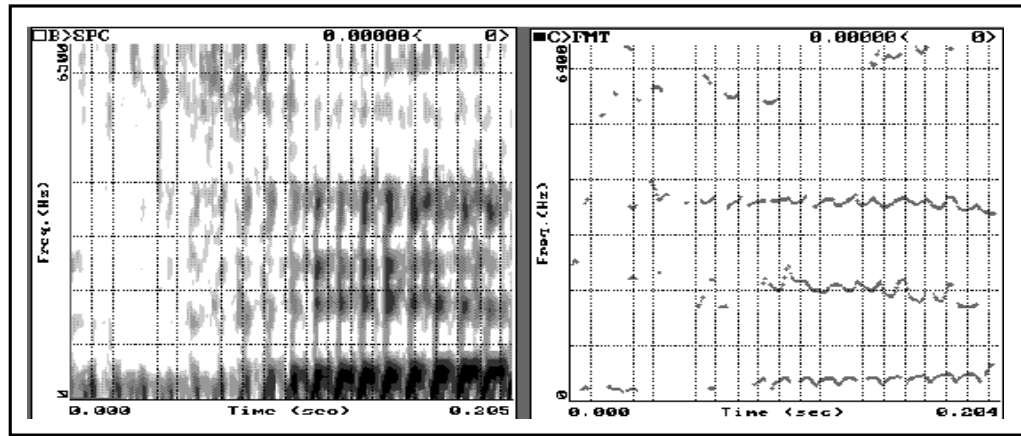
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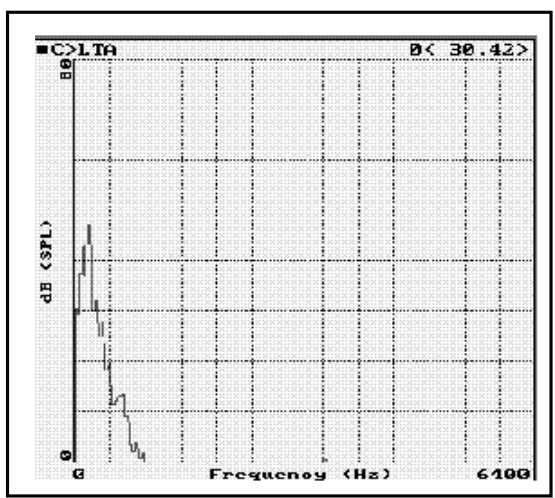
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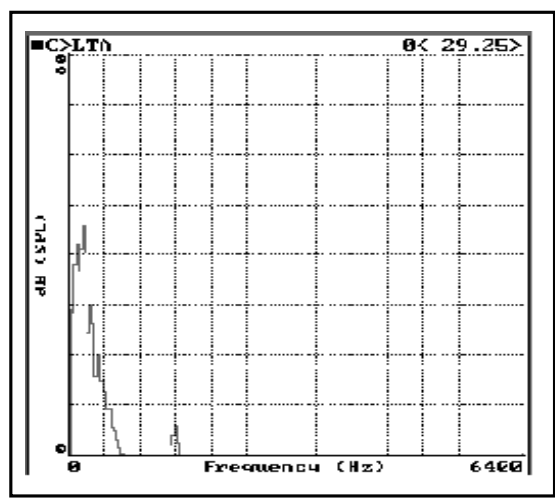
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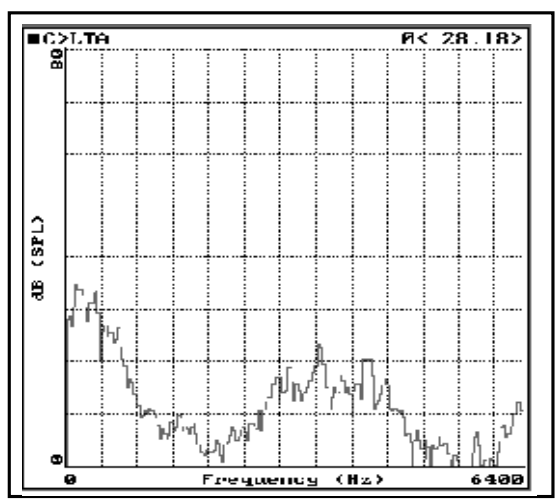
(dB)			(dB)	
7.86			10.06	
8.62			11.93	
7.74			9.14	
9.31			11.82	



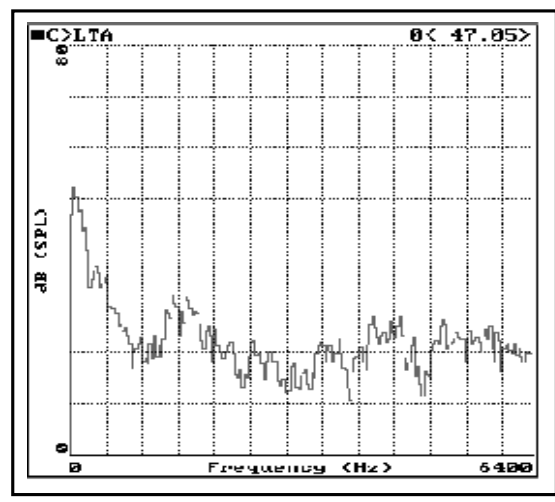
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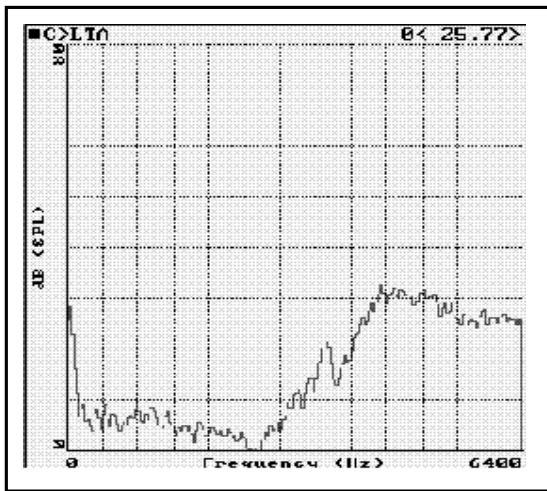
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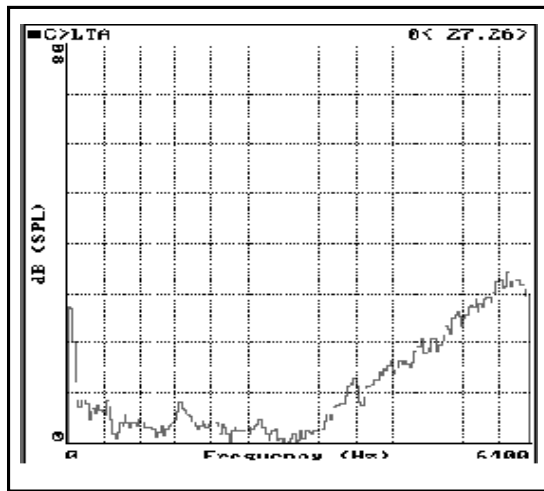
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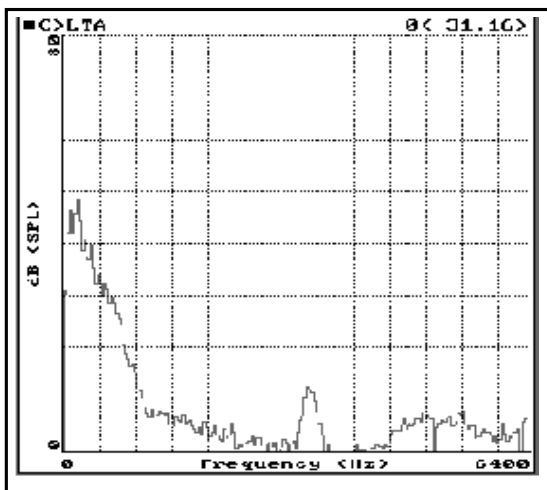
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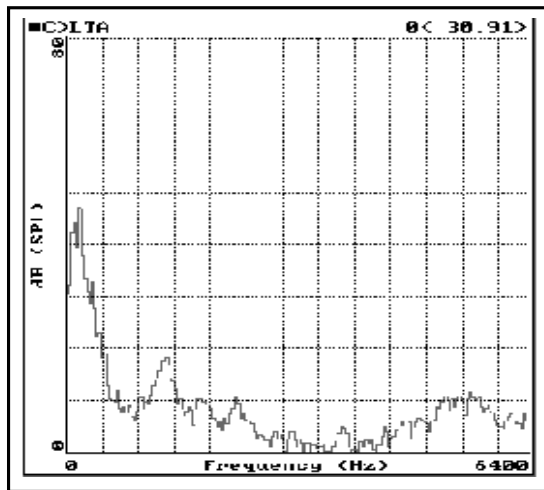
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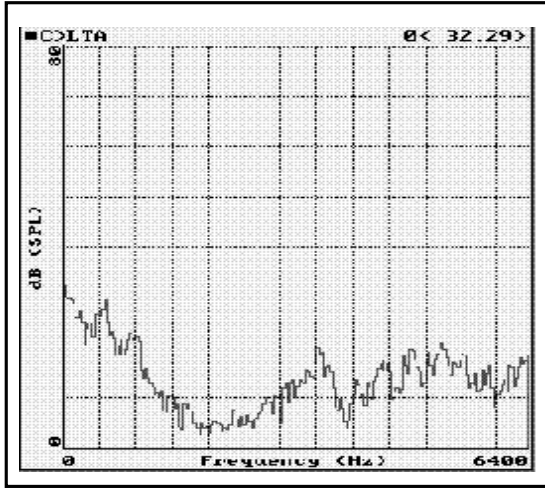
								(dB)
3.47	1.84	12.09	4.47	17.14	13.02	14.25	13.48	
4.41	1.41	9.49	2.22	7.43	4.60	13.45	10.20	
5.31	4.33	12.66	3.27	12.60	12.60	10.64	9.43	
7.71	7.06	11.73	7.27	15.47	14.70	13.46	12.74	
11.74	9.12	3.94	1.97	11.12	8.60	13.22	12.22	
8.45	5.26	6.94	6.49	13.73	13.45	12.00	9.90	
4.80	2.85	10.24	4.67	13.09	10.49	9.91	7.05	
2.88	1.15	2.28	2.14	9.98	8.86	4.34	3.09	
2.39	3.32	3.44	3.50	11.47	12.77	3.16	4.28	

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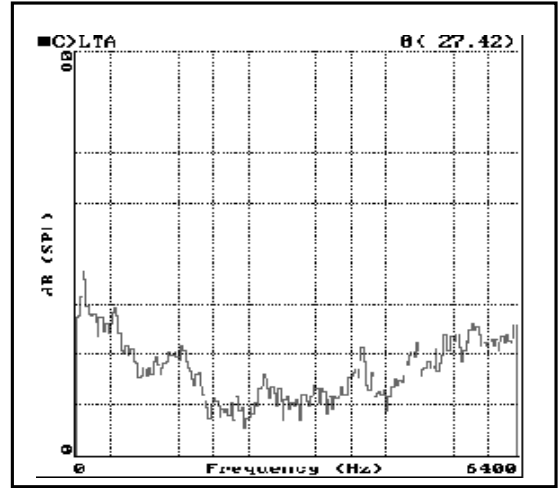
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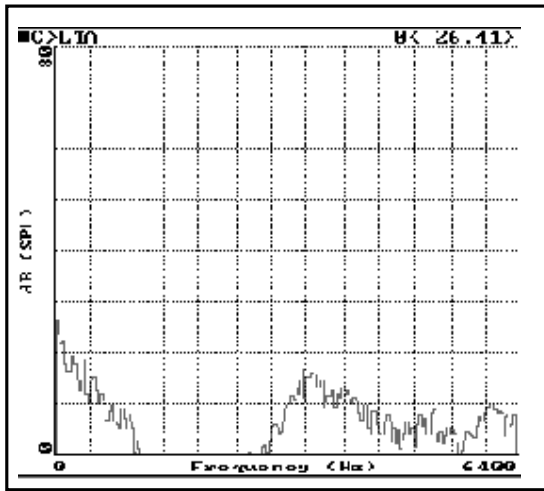
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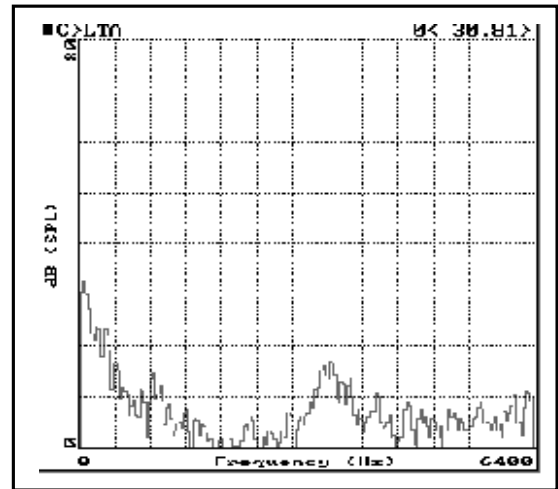
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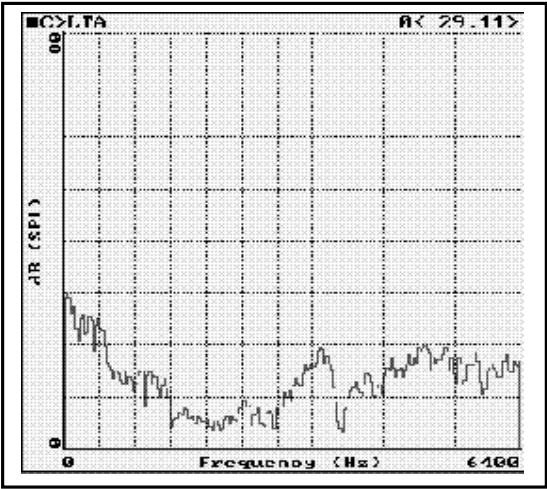
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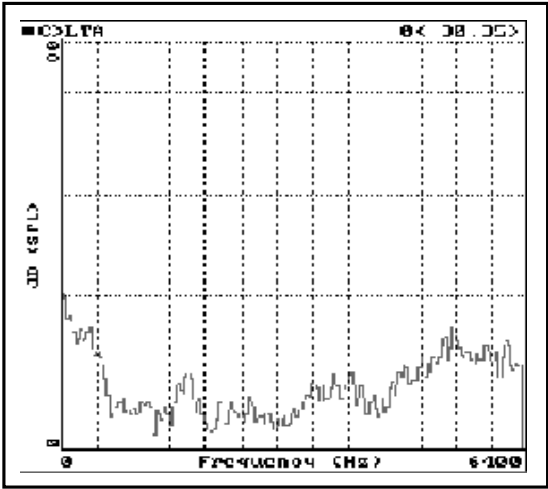


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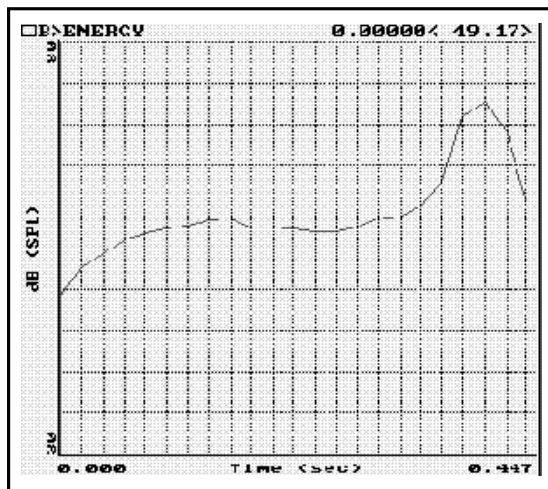
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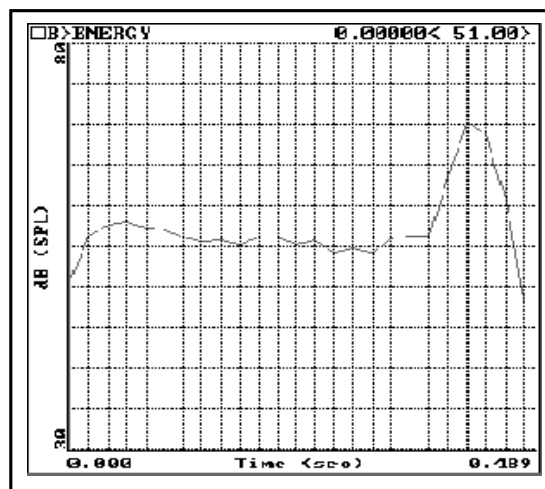
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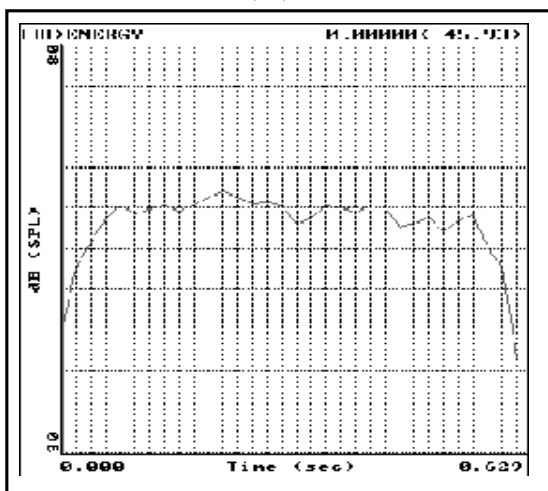
(dB)			(dB)	
58.04			60.54	
57.23			59.16	
56.88			59.64	
57.08			58.55	



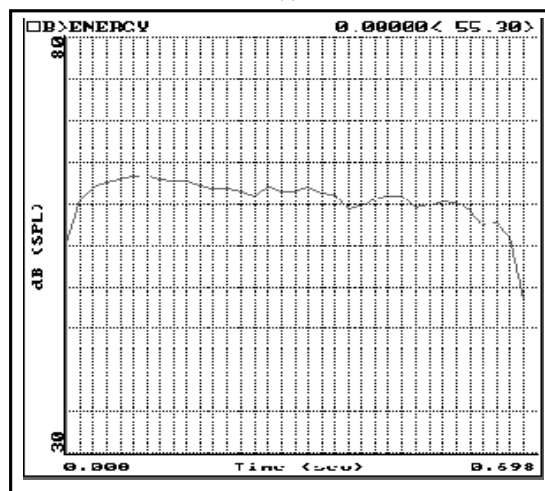
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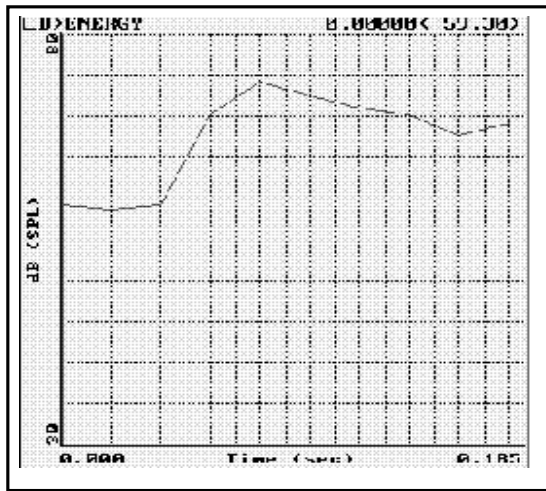
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								(dB)
60.96	59.08	63.70	71.29	64.61	62.26	68.36	71.67	
56.76	58.92	70.82	63.39	65.66	65.18	68.46	69.64	
57.96	57.27	64.63	65.68	62.21	60.22	64.81	67.43	
63.12	61.94	59.60	61.68	66.36	67.28	67.14	67.85	
60.51	58.39	59.00	59.03	65.52	66.87	71.98	73.37	
59.54	60.05	57.80	57.33	64.04	64.87	64.64	66.67	
58.96	59.02	54.64	55.23	58.84	61.04	58.49	62.40	
55.98	56.09	57.26	58.03	61.53	62.42	57.17	58.84	
54.46	55.71	48.49	52.62	56.14	60.11	50.64	57.18	

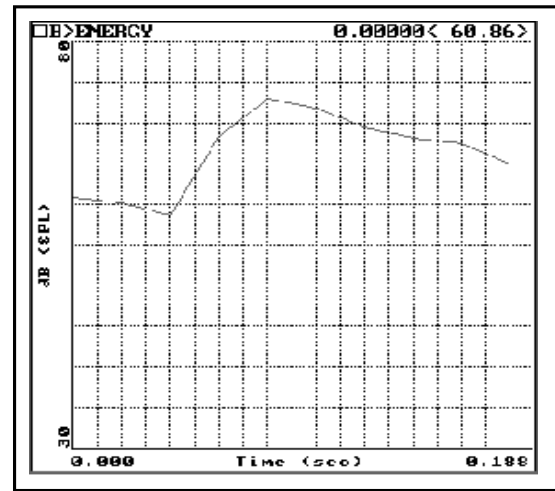
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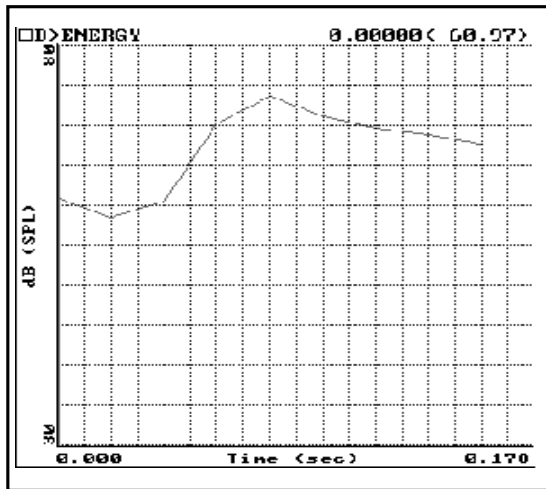




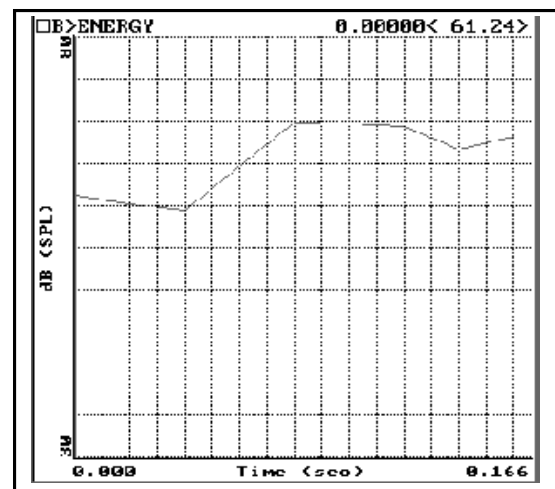
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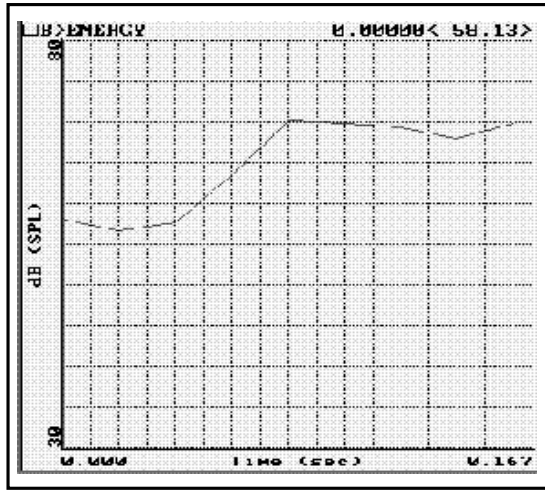
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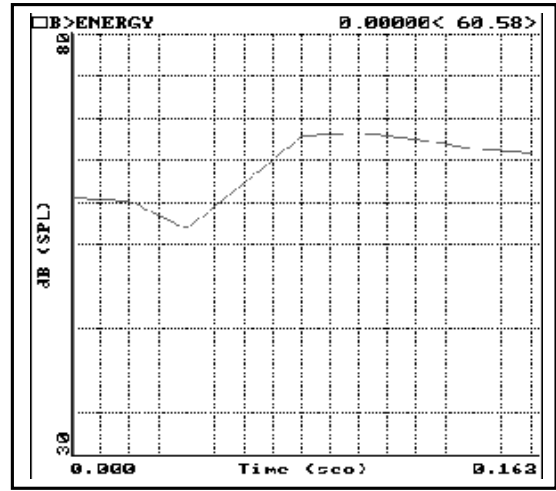
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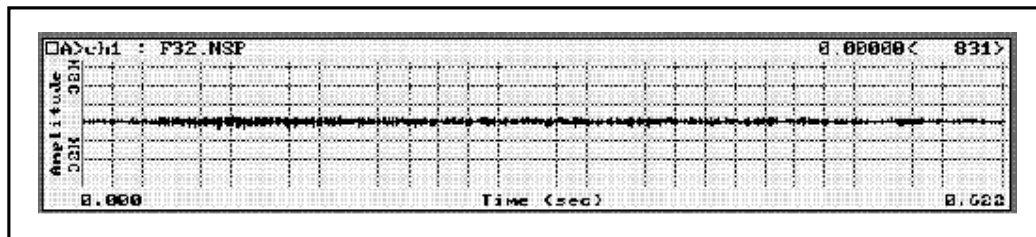
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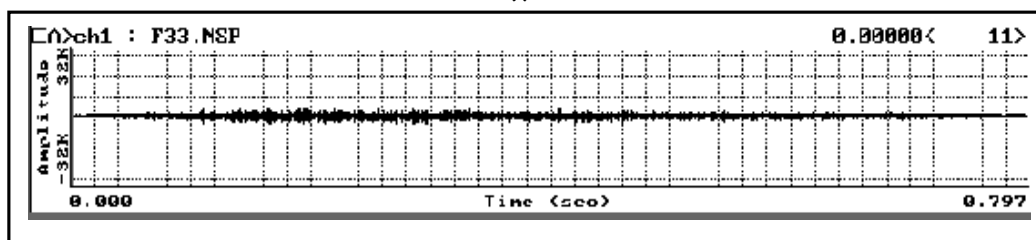
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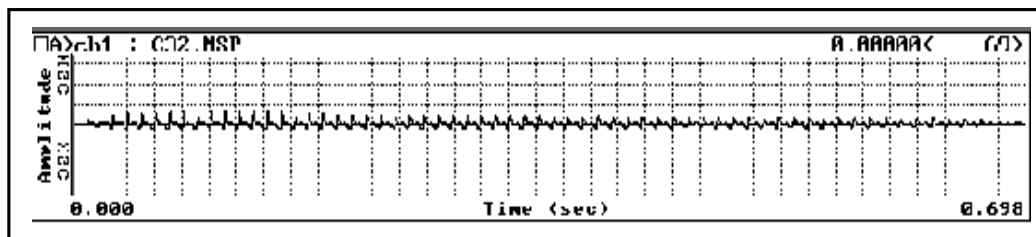
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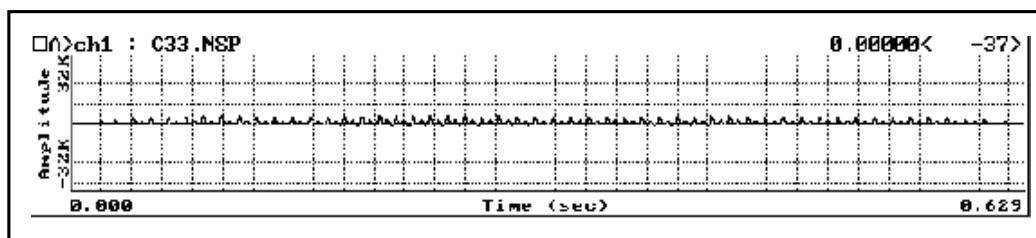
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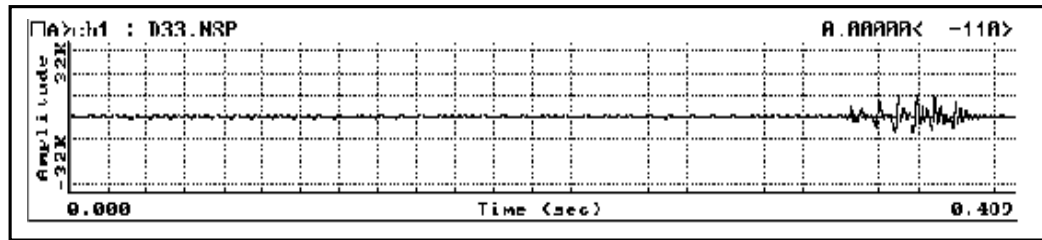
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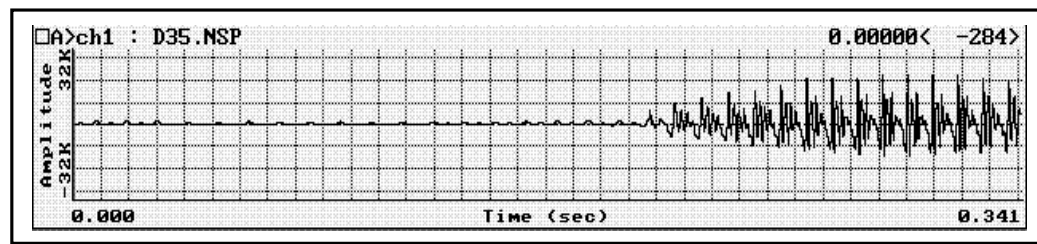
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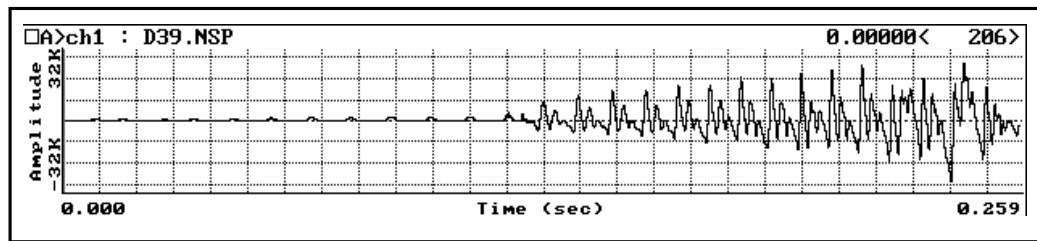
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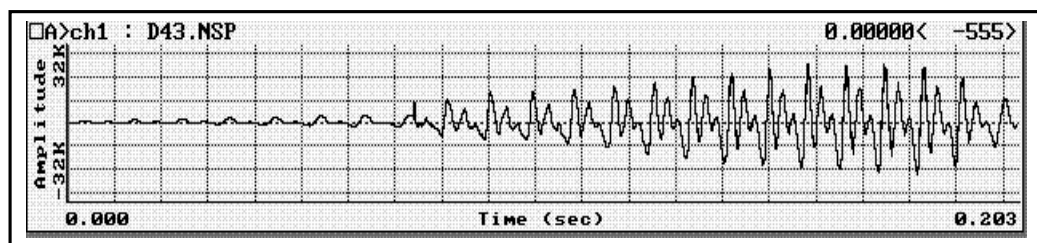
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(sec.)			(sec.)	
0.13			0.14	
0.14			0.15	
0.48			0.54	
0.47			0.55	

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								(sec.)
0.15	0.12	0.25	0.21	0.24	0.19	0.14	0.13	
0.16	0.16	0.23	0.22	0.22	0.19	0.16	0.14	
0.17	0.18	0.27	0.23	0.26	0.22	0.14	0.16	
0.19	0.19	0.23	0.22	0.20	0.19	0.19	0.20	
0.17	0.20	0.27	0.22	0.20	0.21	0.22	0.20	
0.16	0.20	0.22	0.25	0.21	0.23	0.22	0.22	
0.23	0.26	0.26	0.22	0.28	0.18	0.27	0.27	
0.28	0.28	0.31	0.25	0.27	0.25	0.34	0.29	
0.25	0.29	0.24	0.27	0.26	0.26	0.27	0.31	

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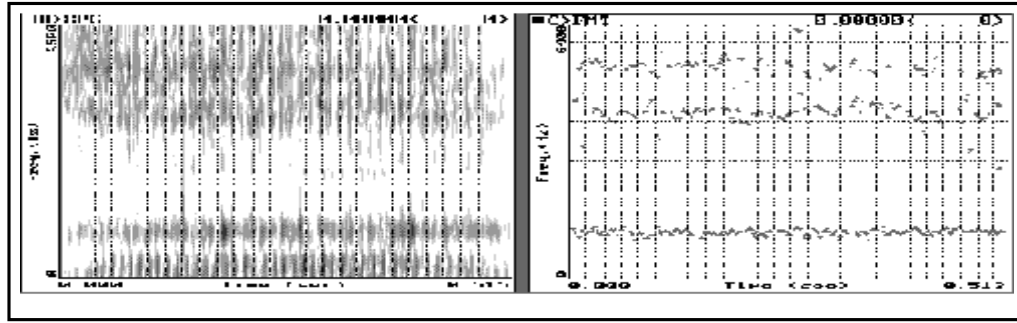
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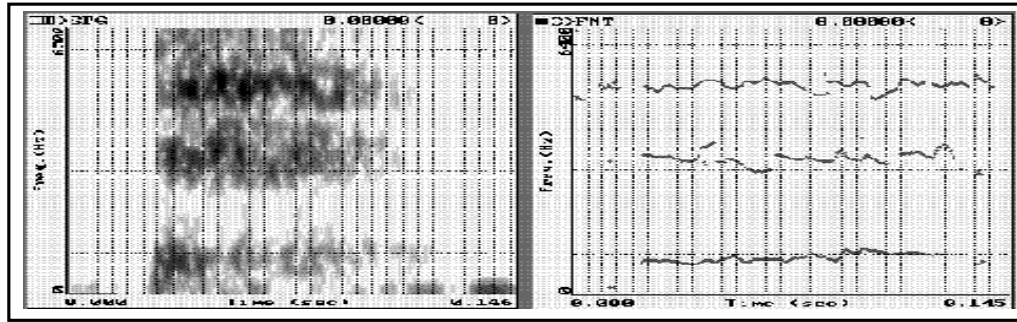
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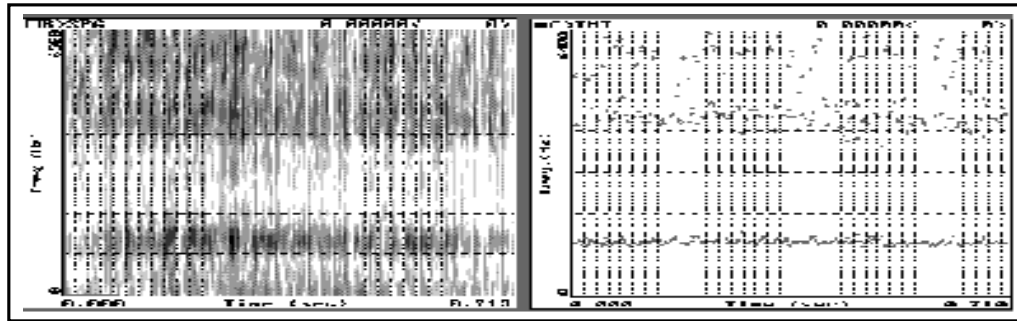
(Hz)	
2804	
2957	
2984	



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			(Hz)
2301	2577	2295	
2391	2690	2345	
2495	2775	2400	
2020	2412	2095	
2277	2423	2110	
2392	2573	2183	
2322	2346	2311	
2616	2468	2520	
2637	2884	2751	

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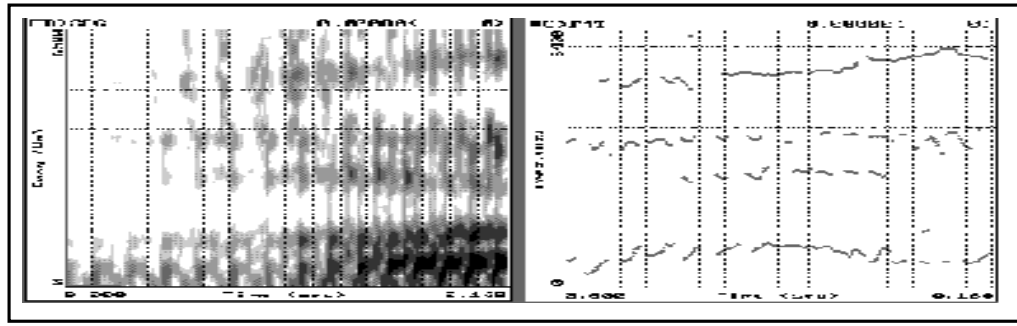
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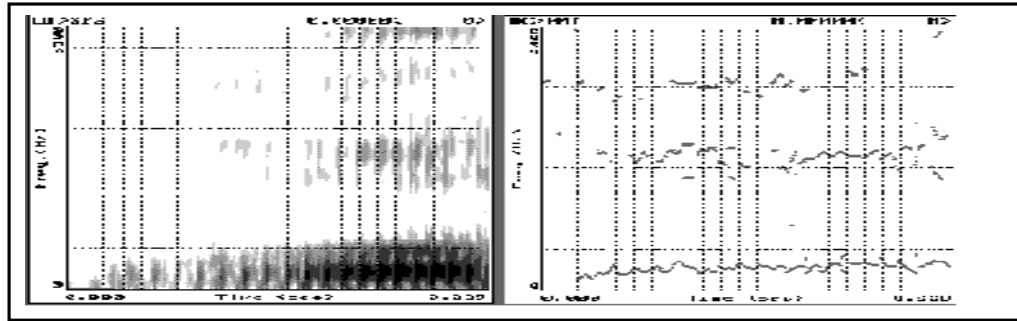
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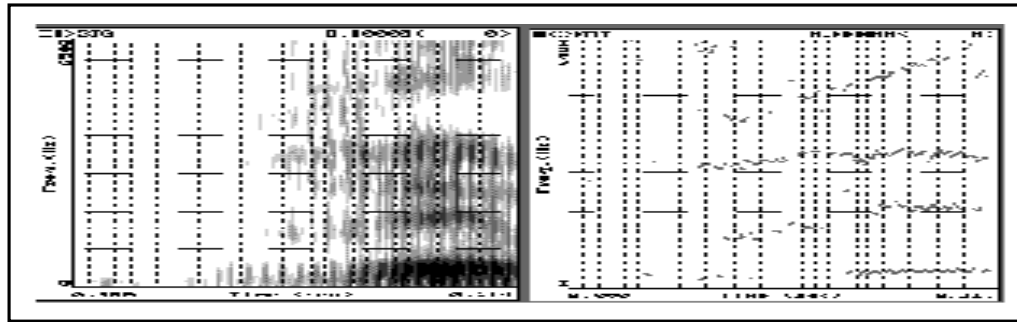
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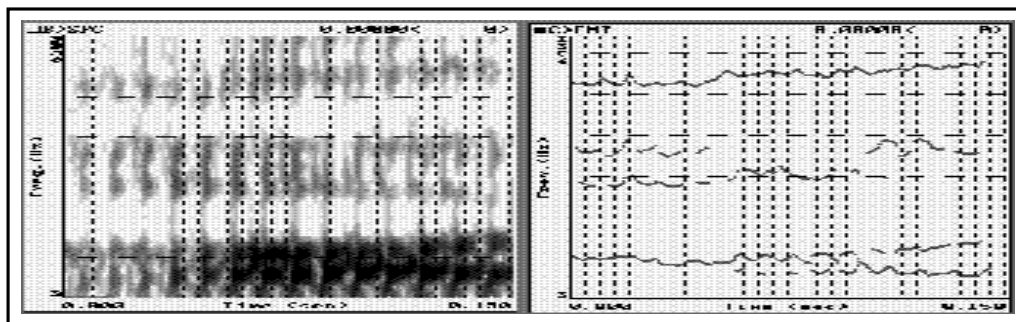
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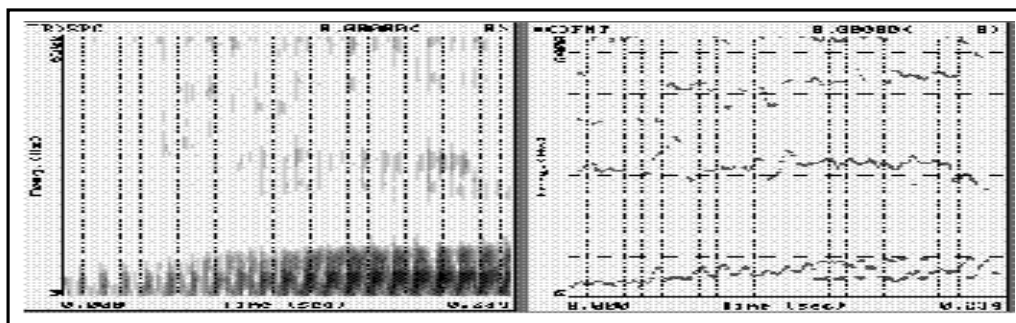
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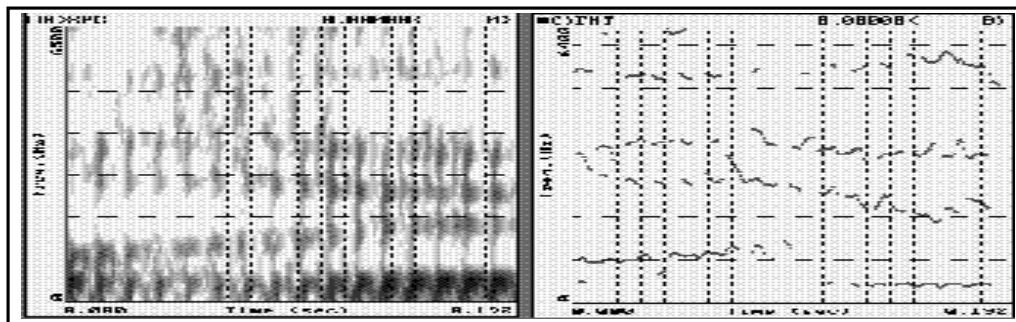
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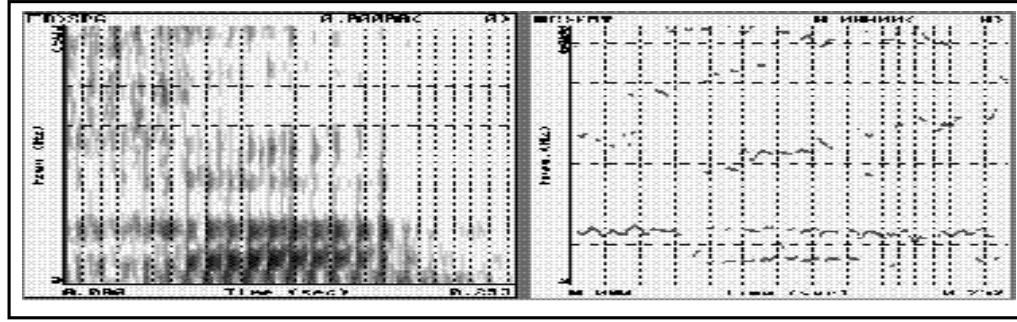


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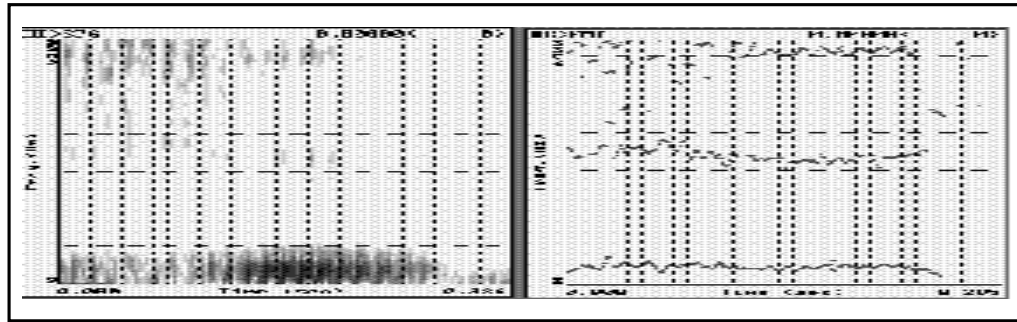


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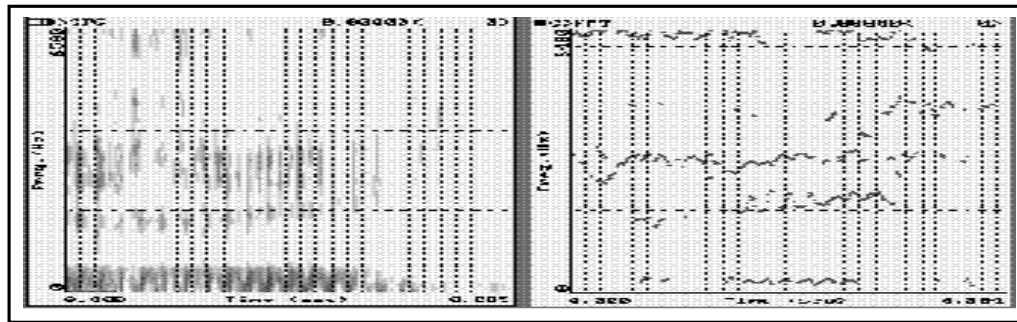
1. -  
2. -  
3. -  
4. -  
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(dB)	
10.76	
10.15	
9.84	

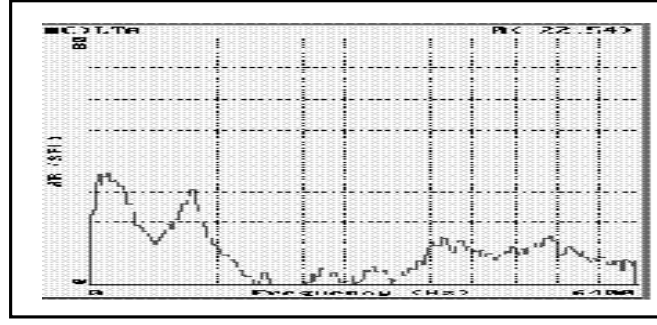
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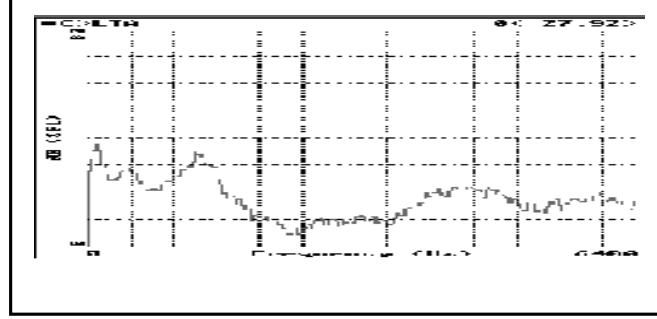
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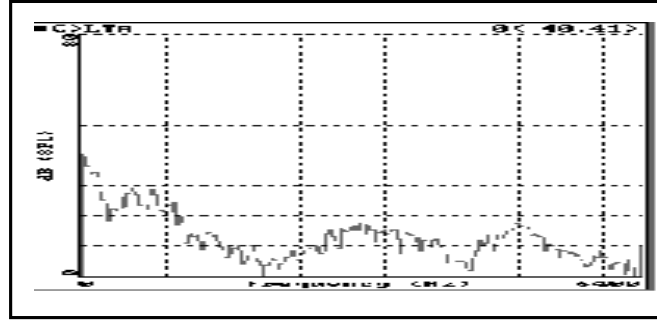
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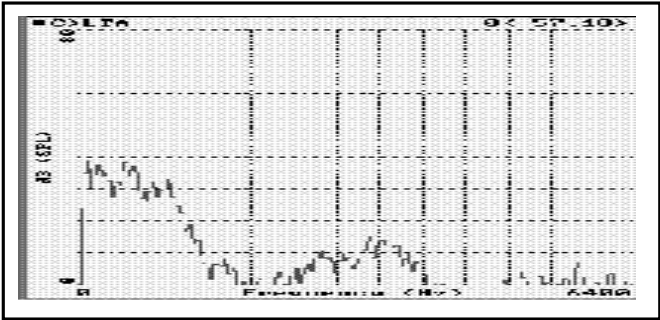
			(dB)
10.81	15.43	14.29	
9.45	8.30	12.57	
6.56	7.09	7.50	
14.09	13.93	9.26	
6.55	6.53	6.76	
11.07	12.59	7.11	
10.49	12.50	10.82	
9.66	9.31	10.30	
7.62	6.98	7.34	

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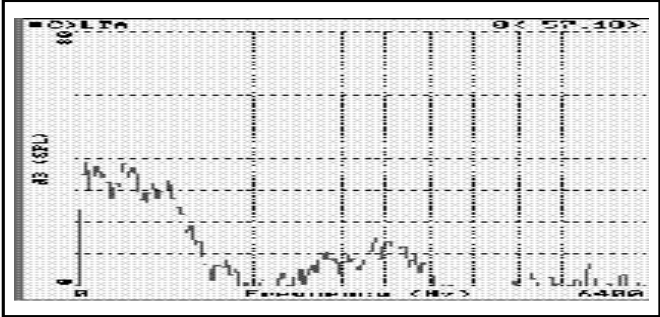
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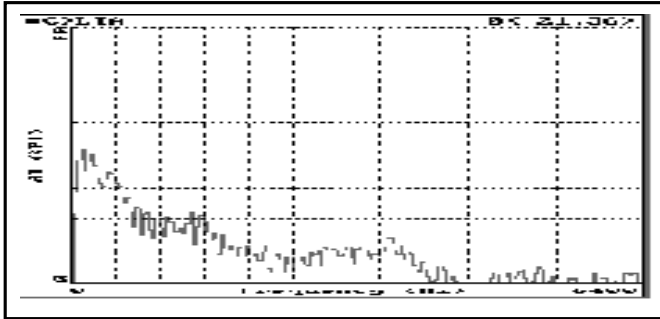
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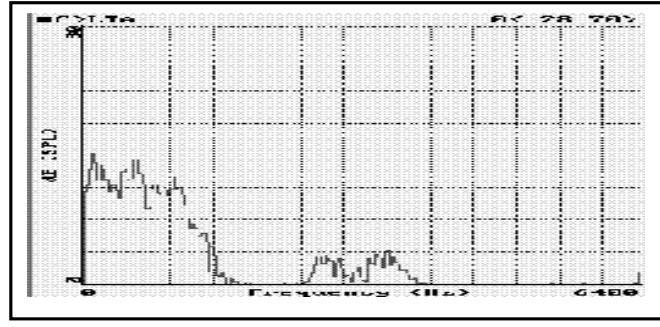


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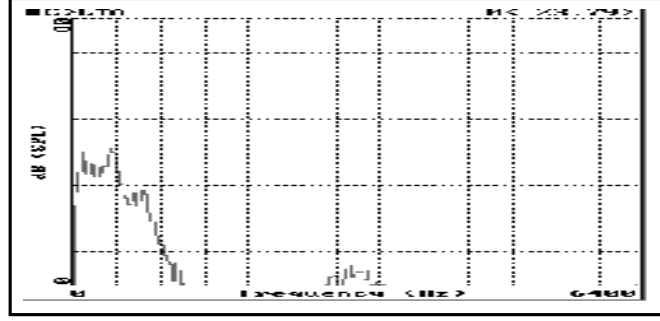


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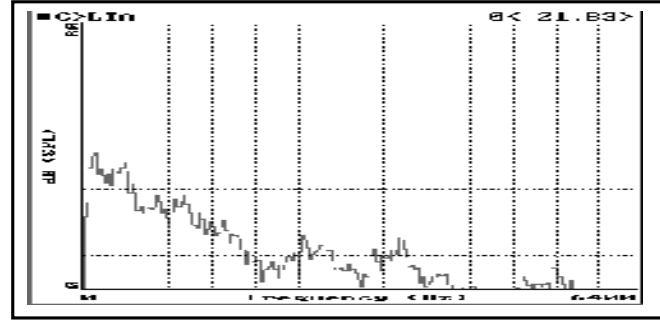
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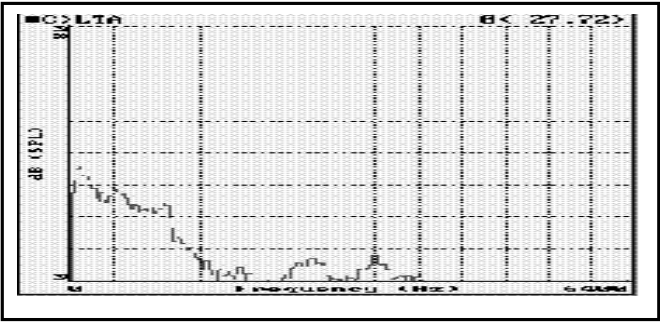
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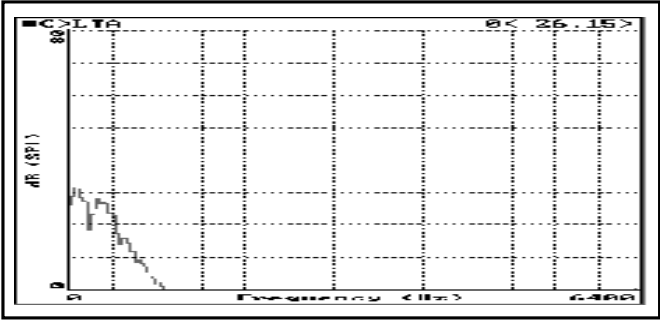
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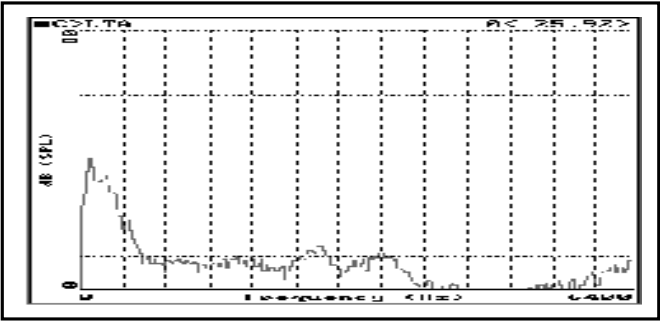
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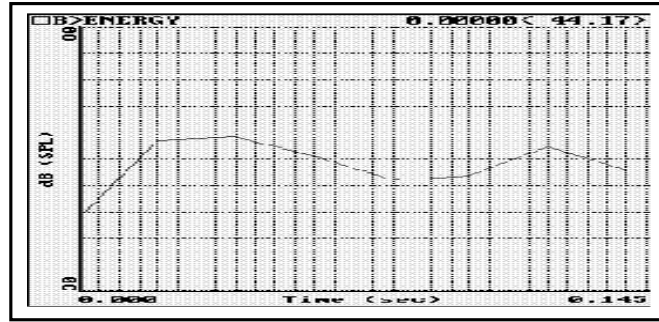
(dB)	
54.89	
52.61	
53.28	

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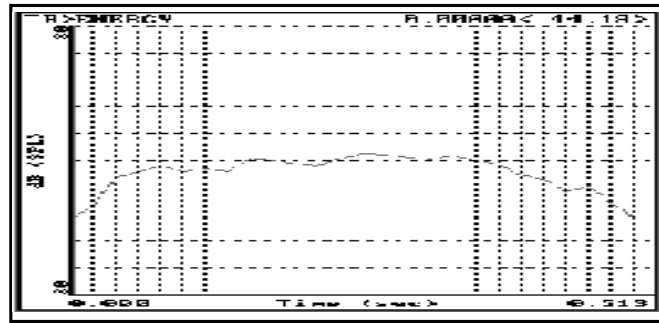
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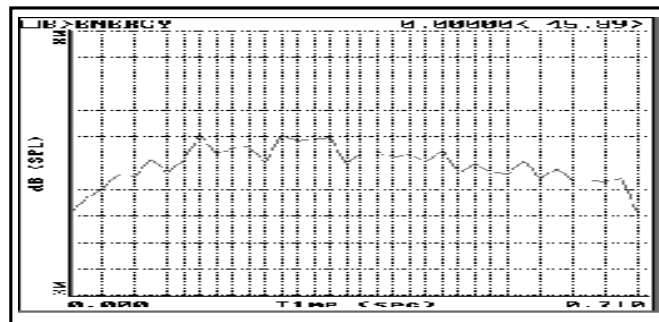
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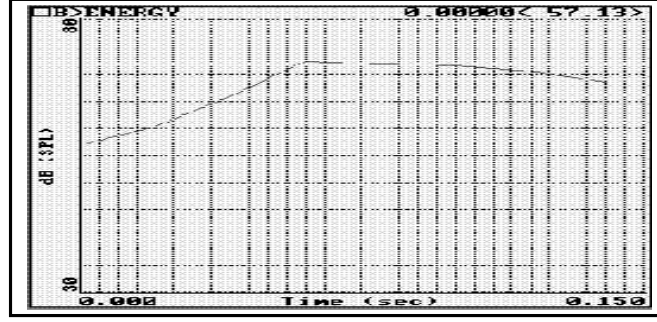
			(dB)
59.49	56.10	59.18	
57.81	54.67	58.34	
53.58	52.02	57.06	
62.32	59.66	58.76	
61.14	57.68	56.86	
60.12	56.31	54.30	
57.16	57.17	52.64	
55.22	55.61	51.37	
50.76	50.44	50.21	

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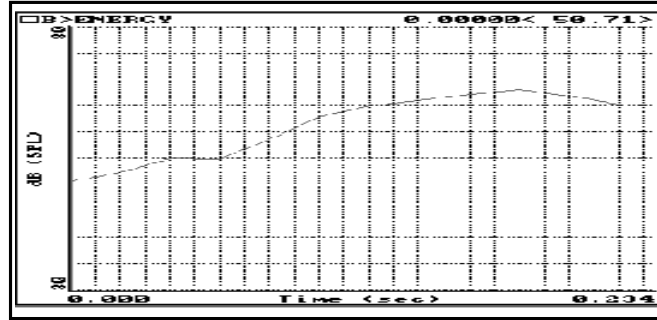
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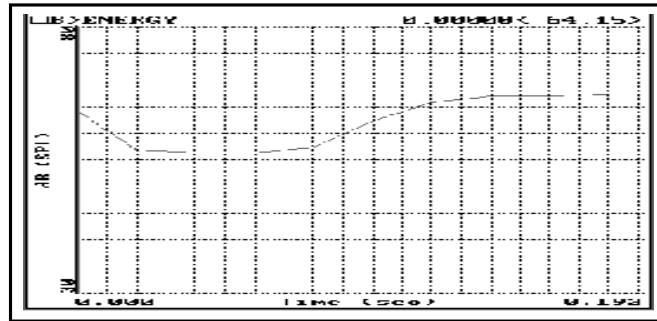
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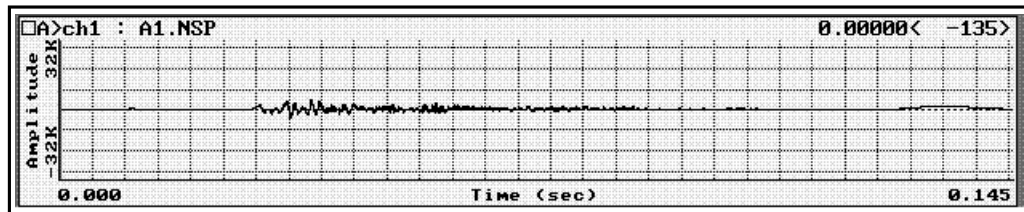
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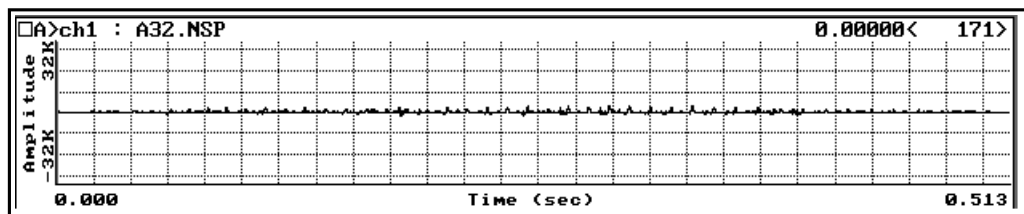
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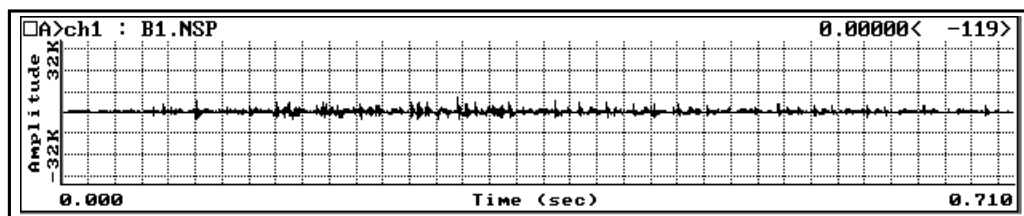
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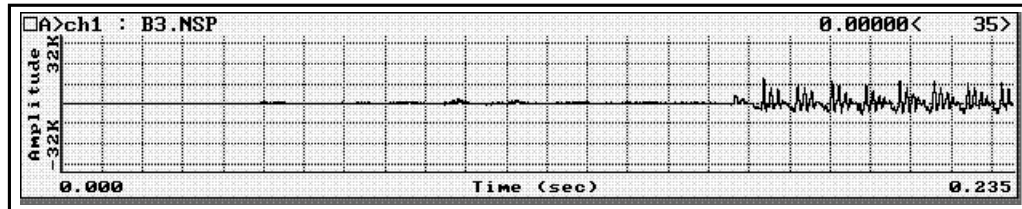


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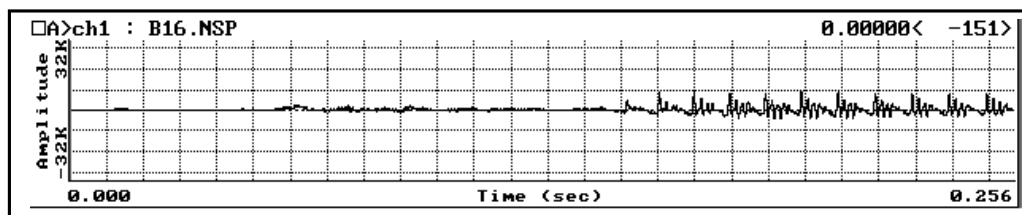
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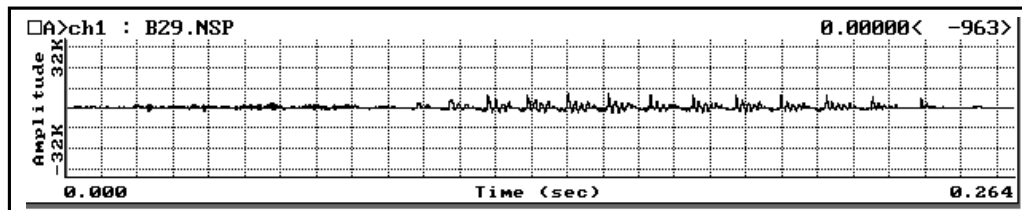
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(sec.)	
0.15	
0.42	
0.41	

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			(sec.)
0.16	0.14	0.13	
0.17	0.17	0.14	
0.20	0.18	0.16	
0.15	0.17	0.16	
0.22	0.20	0.18	
0.19	0.21	0.19	
0.25	0.21	0.28	
0.28	0.22	0.29	
0.29	0.29	0.30	

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(sec.)	(dB)	(dB)	(Hz)	
0.60	59.21	10.26	2578	
0.58	63.67	10.50	2168	

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(sec.)	(dB)	(dB)	(Hz)	
0.15	66.20	8.20	1992	
0.15	65.65	7.78	2105	
0.14	62.93	5.32	2383	
0.14	65.83	7.24	1871	
0.13	62.18	5.14	2161	
0.13	61.34	4.86	2390	
0.17	59.97	5.32	1892	
0.21	58.41	3.08	2132	
0.22	48.04	2.51	2396	

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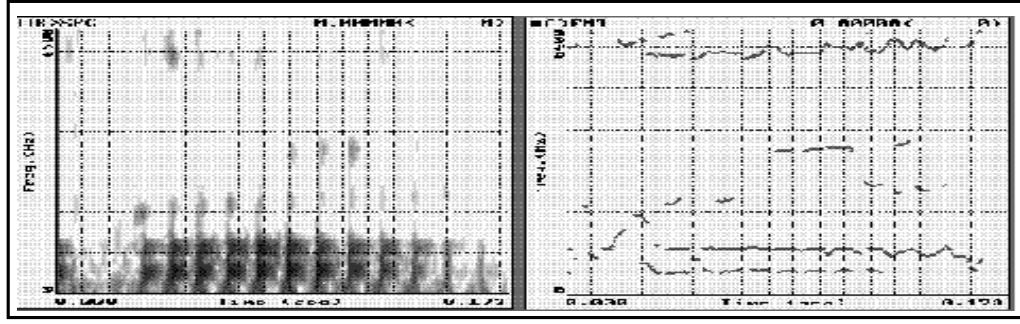
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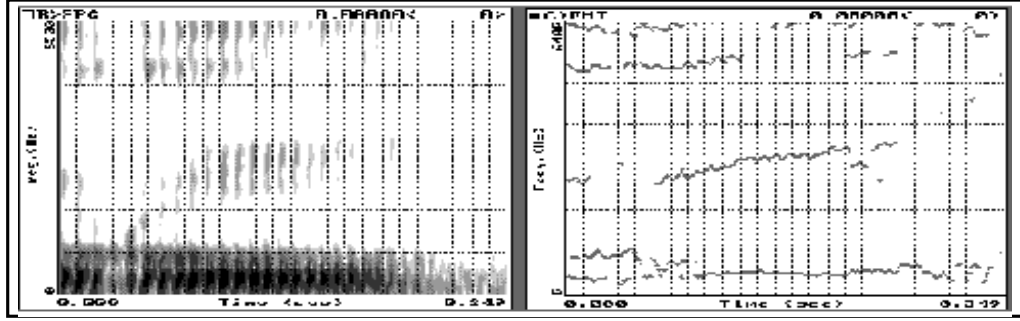
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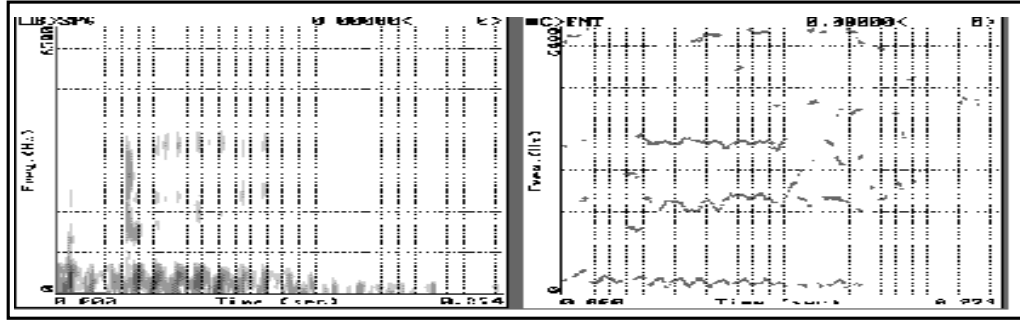




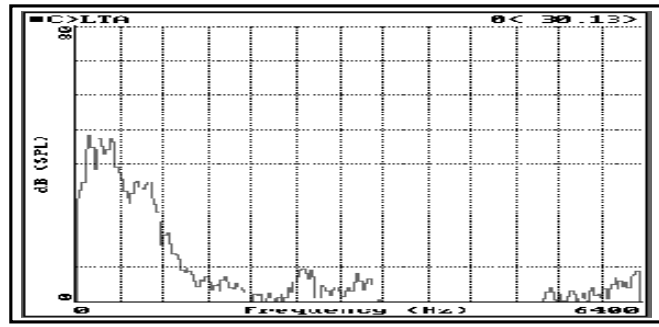
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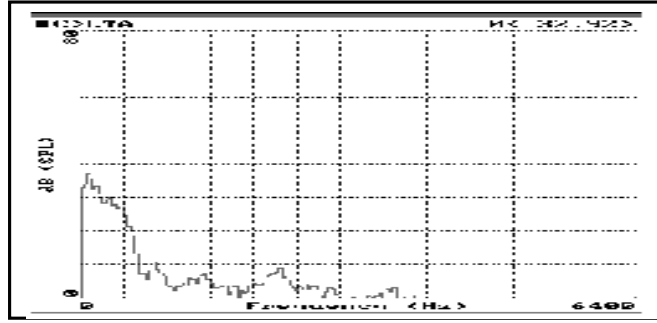
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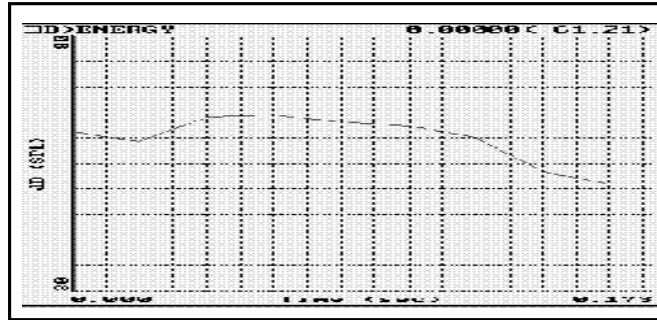
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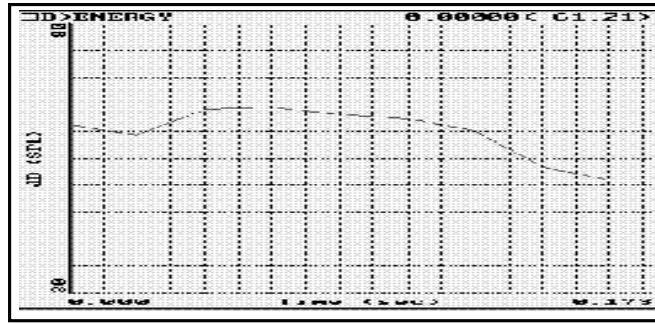
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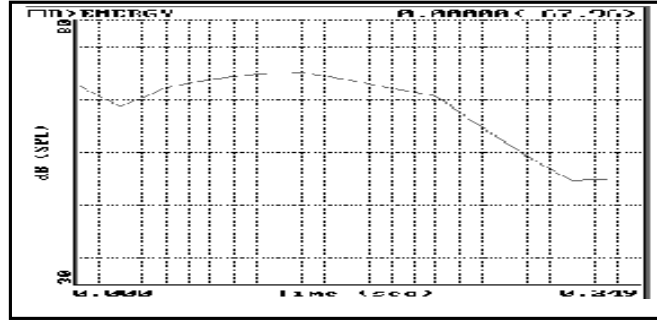
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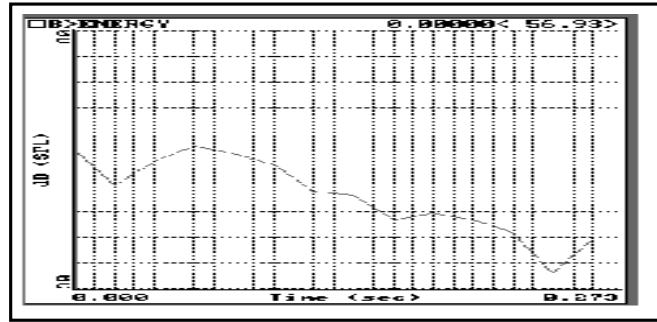
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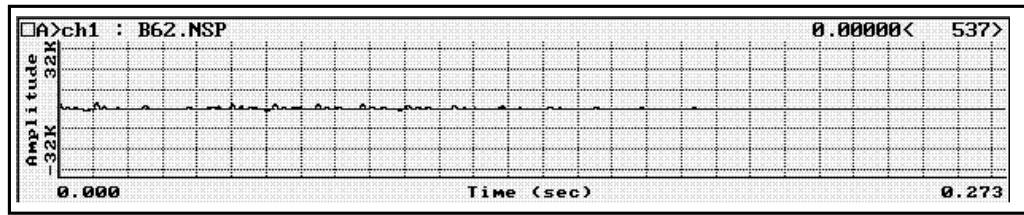


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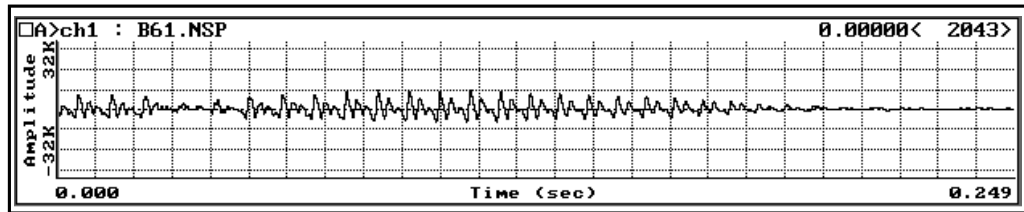


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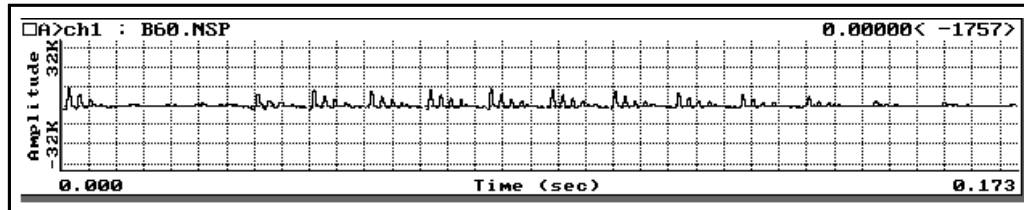
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Catford, J (1977), **Fundamental Problems in Phonetics**, Indiana University Press.

Fry, D (1985), **The Physics of Speech**, fifth edition, Cambridge University Press.

Harrell, Richards (1957), **The Phonology of Colloquial Egyptian Arabic**, New York : American Council of Learned Societies.

Lieberman, Philip (1977), **Speech Physiology and Acoustic Phonetics**, New York : Macmillan Publishing co.

Pickett, J.M (1998), **The Acoustic of Speech Communication Fundamentals, Speech Perception Theory, and Technology**, Allyn and Bacon, no edition, 1998.

Ahmed, Mohamed Salah El Din, Articulatory( EPG) Characteristics of the Arabic emphatic plosives.

Ali, L.H. and Daniloff, R.G. Acinefluorographic- Phonologic Investigation of Emphatic Sound Assimilation in Arabic, **The International Congress of Phonetic Sciences**, 7<sup>th</sup> , 1972.

Delattre, P. Pharyngeal Features in the Consonants of Arabic, German, Spanish, French, and American English. **Phonetica**, vol. 23, 1971.

El- Halees, Yousef, The role of F1 in the Place -of – articulation in Arabic, **Journal of phonetics**, vol. 13, 1985.

El- Halees, Yousef, Ultrasonic study of emphatic and non-emphatic sounds in Arabic, **Journal of linguistics**, Algeria, vol. 11, 1984.

Ferguson, Charles A. The emphatic L in Arabic, **Readings in Arabic Linguistics**, Indiana University Linguistics Club, Bloomington, 1978.

Jakobson, Roman, ' Mufaxxama ', The 'Emphatic' phonemes in Arabic , **Readings in Arabic Linguistics**, Indiana University Linguistics Club, Bloomington, 1978.

Lehn, Walter, Emphasis in Cairo Arabic, **Readings in Arabic Linguistics**, Indiana University Linguistics Club, Bloomington, 1978.

Younes, Munther A .Emphasis spread in Two dialects, **Current Issues in LinguisticTheory**, vol. 101,1993.

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El- Halees,Yousef, A Xeroradiographic, Ultrasonic, Laryngoscopic And Acoustic Study Of Pharyngeals And Emphatics In Arabic.

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# THE ARTICULATORY AND ACOUSTIC ANALYSIS OF EMPHATIC SOUNDS IN ARABIC

By

Nader Jum'a Hanafeyyeh

Supervisor

Dr. Ja'far Nayef Ababneh

## ABSTRACT

This dissertation studies the Arabic emphatic sounds from an acoustic and articulatory perspective.

It contains three chapters, the first discusses the concept of emphasis and non-emphasis as have been described in the traditional and cotemporary works of phonetics .And deals with parts-of- articulation and characteristics of emphatic sounds in early and present time.

The second chapter endeavors to analyze the articulatory correlates of emphatics, discussing an articulatory concept for emphatic sound more inclusion than pretended by present scholars, classifying the emphatic sounds according to its nature, but not on basics do not relate to it, or more than one specific base. Furthermore, it explains the role of vowels in emphasis.

The third chapter investigates some acoustic features of emphatic sounds like, sound formants, sound pressure level, acoustic energy, duration, and wave shape.

Thus it studies some acoustic concepts and explains the processes of the acoustic analysis, then it deals with the results and compares between it and the articulatory characteristics of emphatics.

